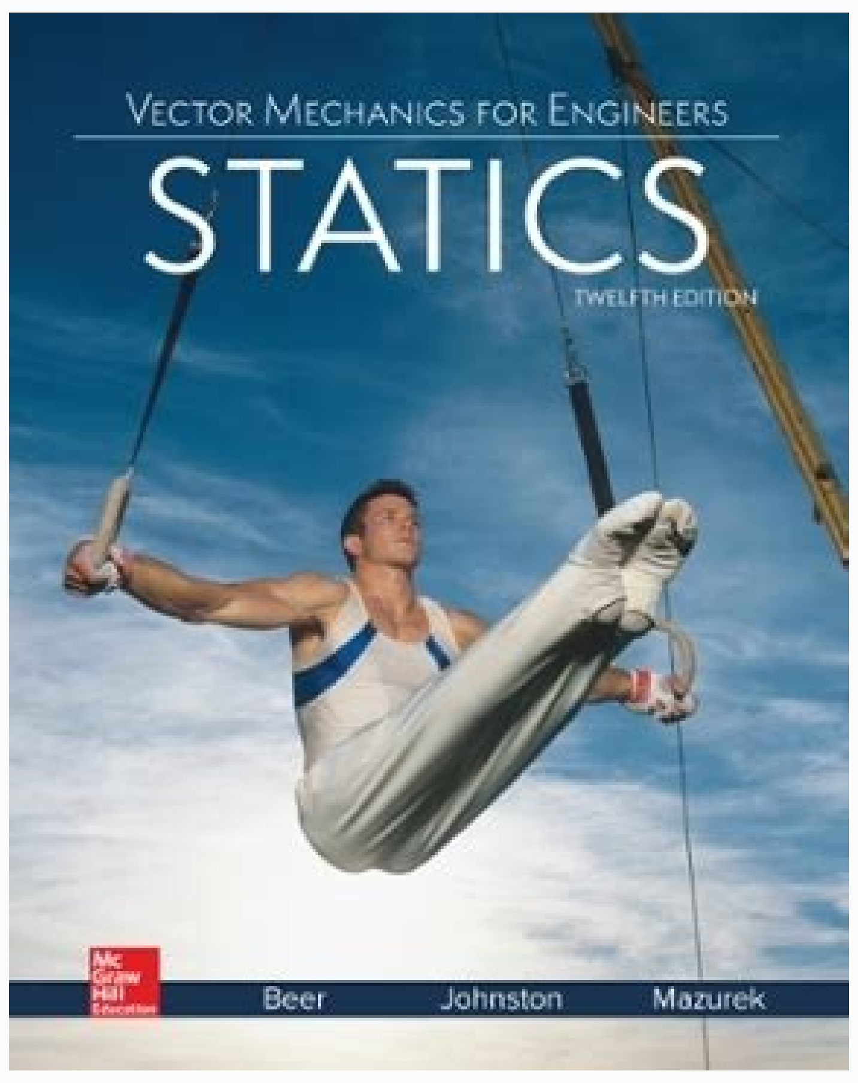
Solution manual for vector mechanics for engineers statics and dynamics 11th edition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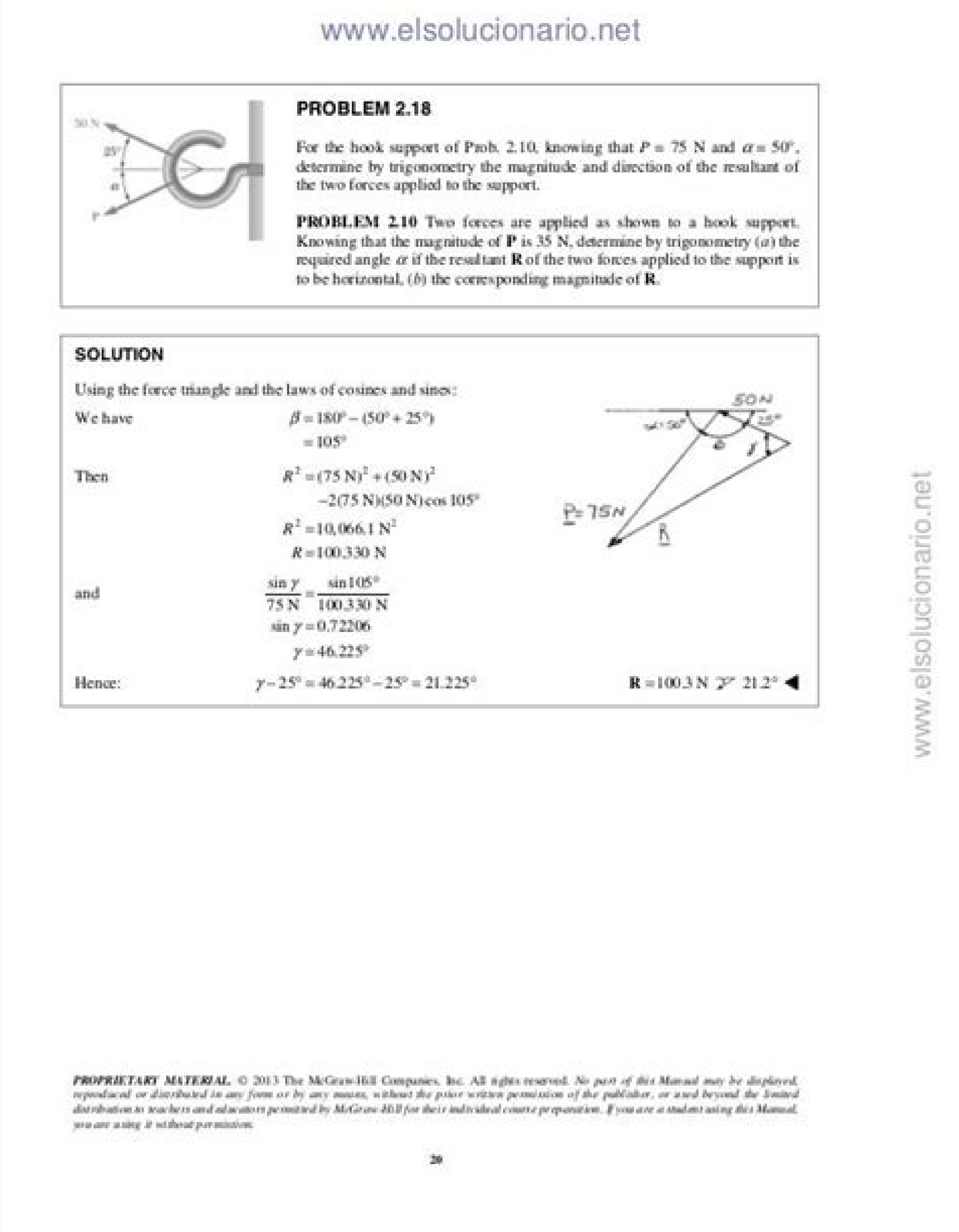
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PROBLEM 2.18

For the hook support of Prob. 2.10, knowing that $P = 75$ N and $\alpha = 50°$, determine by trigonometry the magnitude and direction of the resultant of the two forces applied to the support.

PROBLEM 2.10 Two forces are applied as shown to a hook support. Knowing that the magnitude of **P** is 35 N, determine by trigonometry (*a*) the required angle α if the resultant **R** of the two forces applied to the support is to be horizontal, (*b*) the corresponding magnitude of **R**.

SOLUTION

Using the force triangle and the laws of cosines and sines:

We have $\beta = 180° - (50° + 25°)$

$= 105°$

Then $R^2 = (75\text{ N})^2 + (50\text{ N})^2 - 2(75\text{ N})(50\text{ N})\cos 105°$

$R^2 = 10{,}066.1\text{ N}^2$

$R = 100.330\text{ N}$

and $\dfrac{\sin\gamma}{75\text{ N}} = \dfrac{\sin 105°}{100.330\text{ N}}$

$\sin\gamma = 0.72206$

$\gamma = 46.225°$

Hence: $\gamma - 25° = 46.225° - 25° = 21.225°$ **R** $= 100.3$ N ⦣ 21.2° ◀

50 N
α = 50°
25°
β
γ
P = 75 N
R

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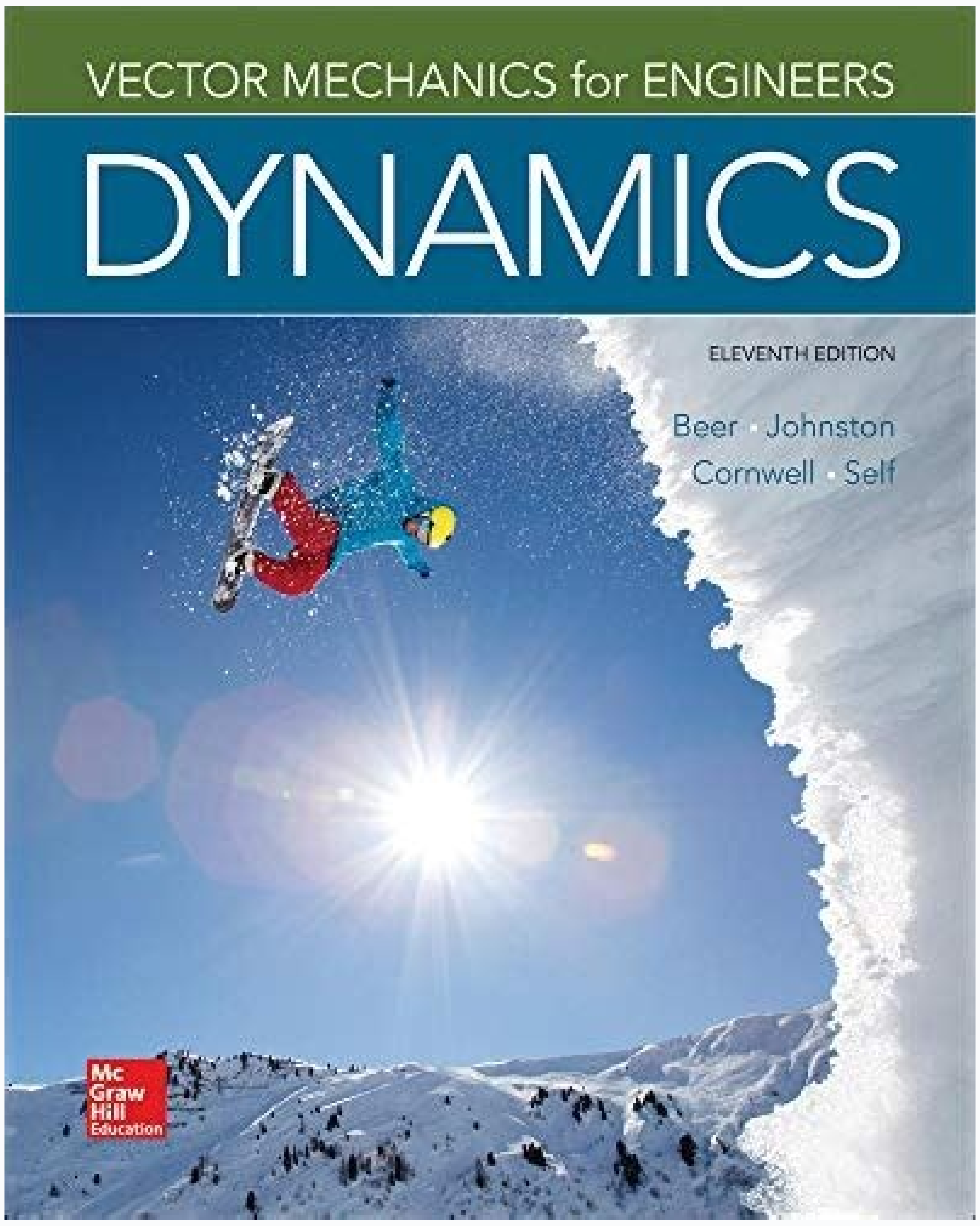
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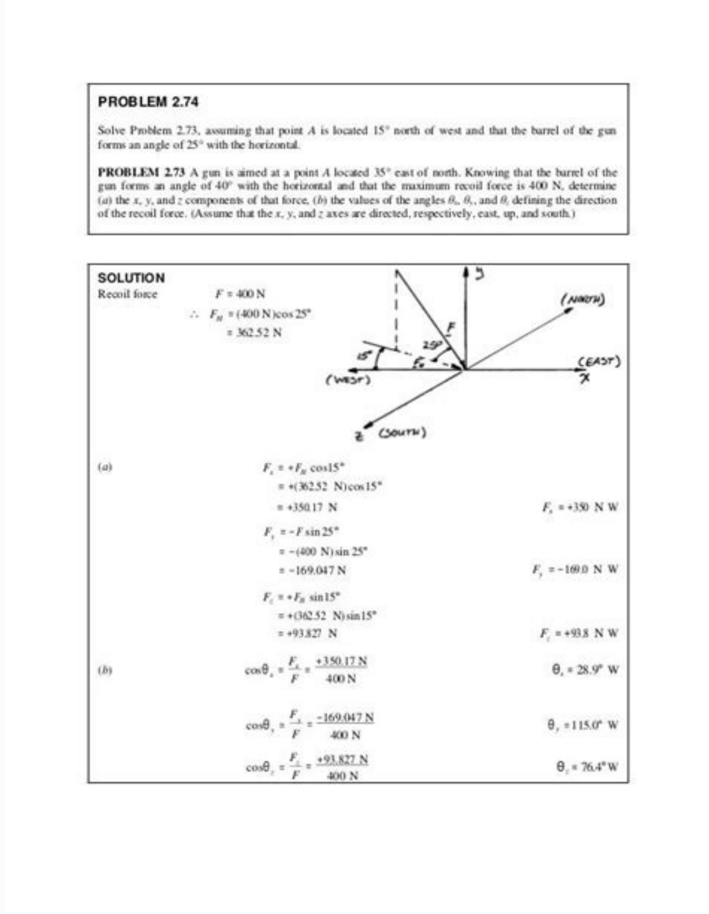


PROBLEM 2.74

Solve Problem 2.73, assuming that point A is located 15° north of west and that the barrel of the gun forms an angle of 25° with the horizontal.

PROBLEM 2.73 A gun is aimed at a point A located 35° east of north. Knowing that the barrel of the gun forms an angle of 40° with the horizontal and that the maximum recoil force is 400 N, determine (a) the x, y, and z components of that force, (b) the values of the angles θ_x, θ_y, and θ_z defining the direction of the recoil force. (Assume that the x, y, and z axes are directed, respectively, east, up, and south.)

SOLUTION

Recoil force $F = 400$ N

$\therefore F_H = (400\text{ N})\cos 25° = 362.52\text{ N}$

(a) $F_x = +F_H\cos 15° = +(362.52\text{ N})\cos 15° = +350.17\text{ N}$ $F_x = +350$ N W

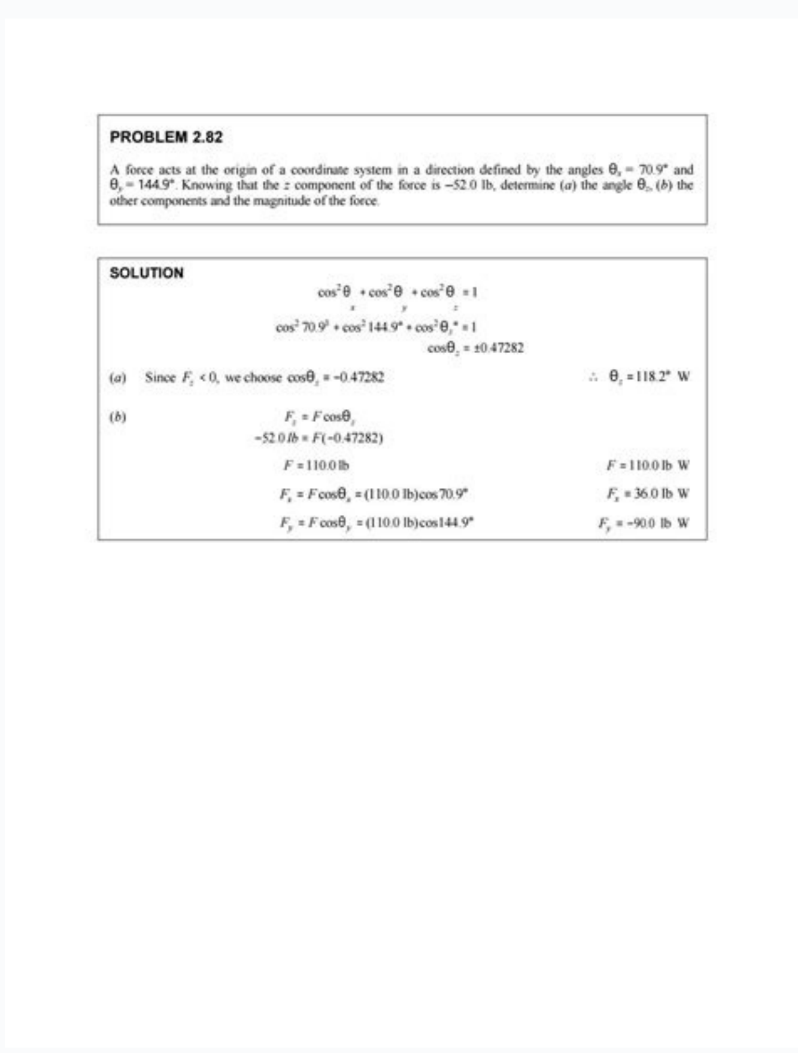
$F_y = -F\sin 25° = -(400\text{ N})\sin 25° = -169.047\text{ N}$ $F_y = -169.0$ N W

$F_z = +F_H\sin 15° = +(362.52\text{ N})\sin 15° = +93.827\text{ N}$ $F_z = +93.8$ N W

(b) $\cos\theta_x = \frac{F_x}{F} = \frac{+350.17\text{ N}}{400\text{ N}}$ $\theta_x = 28.9°$ W

$\cos\theta_y = \frac{F_y}{F} = \frac{-169.047\text{ N}}{400\text{ N}}$ $\theta_y = 115.0°$ W

$\cos\theta_z = \frac{F_z}{F} = \frac{+93.827\text{ N}}{400\text{ N}}$ $\theta_z = 76.4°$ W



PROBLEM 2.82

A force acts at the origin of a coordinate system in a direction defined by the angles $\theta_x = 70.9°$ and $\theta_y = 144.9°$. Knowing that the z component of the force is −52.0 lb, determine (a) the angle θ_z, (b) the other components and the magnitude of the force.

SOLUTION

$$\cos^2\theta_x + \cos^2\theta_y + \cos^2\theta_z = 1$$

$$\cos^2 70.9° + \cos^2 144.9° + \cos^2\theta_z = 1$$

$$\cos\theta_z = \pm 0.47282$$

(a) Since $F_z < 0$, we choose $\cos\theta_z = -0.47282$ $\therefore \theta_z = 118.2°$ W

(b) $F_z = F\cos\theta_z$

$-52.0\ lb = F(-0.47282)$

$F = 110.0$ lb $F = 110.0$ lb W

$F_x = F\cos\theta_x = (110.0\text{ lb})\cos 70.9°$ $F_x = 36.0$ lb W

$F_y = F\cos\theta_y = (110.0\text{ lb})\cos 144.9°$ $F_y = -90.0$ lb W

Problem 2.116 For the system of problems 2.107 and 2.108, determine the voltage in each cable knowing that solution P = 2880 N and Q = 0. OC = (48) 2 + (90) 2 = 102 in. See the 2.111 problem for problem 2.111 for problem 2.111 for problem 2.111 for problem 2.111 for problem 2.111 figure and analysis that lead to linear algebraic equations (1), (2), and (3) in the following: i: Ã, '4 t + 30 t ã,' 10 t = 0 (1) 21 ab 59 ac 63 ad j: ã, '20 t ã, '50 t ã, '50 t + p = 0 (2) 21 ab K: 5 T 59 AC + 9 T 63 ad Ã, '37 t = 0 (3) 21 AB 59 BC 63 replacements for P = 1800 pounds in equations (1), (2), and (3) mentioned above and resolve the resulting set of equations that use conventional algorithms: Ã, '4 t + 30 t ã,' 10 t = 0 (1 ã, â²) 21 ab 59 ac 63 ad ã, '20 t ã, '50 t Ã, '50 t +1800 lb = 0 (2 â²) 21 ab 59 ac 63 ad 5 t + 9 t Ã ¢ '37 t = 0 (3 - 02) 21 ab 59 ac 63 ad 141. Determines weight w of Container, knowing that the tension in Cable to is 4.3 Kn. Problem 2.23 Determine the X and Y components of each of the forces shown. Determine the weight of the box knowing that the voltage in the AC cable is 544 lb. Determines the range of Q values for which the voltage will not superate the 60 pounds in both cables. Using the triangle rule and the sines law: (a) 75 Â ° + 40 Â ° + Î² = 180 Â ° Î² = 180 Â ° Ã, '75 Ã ã, '40 Â ° = 65 Â ° 1000 lb = T1 t = 938 lb w sin75 Â ° sin65 Â ° 1 (b) 1000 lb = r sin75 Â ° sin 40 Â ° r = 665 lb w 10. solution problem 2.130 to know that î ± = 55 Â ° and that the AC arm exercises on the pin C a direct force along the AC line, determine (a) the size of that force, (b) the voltage in the BC cable. and tab = tab = tab Ãž Â »ab = tab jjjg ab ab = (Ã ¢ '0.48i + 0.8j Ã ¢' 0.36k) tab jjjg t = t Ãžâ» = t ac b ac ac ac = (0.88235J + 0.47059K) tac jjjg t = t Ãž â »= t ad ad ad ad to = (0.51948i + 0.77922 j, '0.35065k) tad equilibrium condition with w = Ã ¢' wj Ãž â Â £ f = 0: tab + tac + tad Ã, 'wj = 0 116. know on on ,oenatnatsi daolnwod ¨Ã olocitrA .ovac led A a ataticrese azrof alled itnenopmoc i eranimreted ,spik 2 ¨Ã BA ovac ni enoisnet al No delay for any reason. Solution 2 2 2 f = fx + fy + fz f = (240 n) 2 + (Ã ¢ âãÂ n) 2 + (Ã ¢ Â'680 n) 2 f = 770 n w cos Ãž î œx = fx f fy = 240 n 770 n Ã ¢ Â'270 n Ãž x = 71.8Ã,Â ° w cos Ãž Ãž y = f fz = 770 n 680 n Ãž @ y = 110.5Ã, w y = f = 770 n Ãž îœz = 28.0 ° w 82. (n) 800 lb 424 lb 408 lb +640 Ã ¢ â € â € â € â € â € â € â € œ Â 'Â' 240 lb) j ry tanÃžÂ ± = rx = 240 608 ÃžÂ ± = 21.541Ã,Â ° r = 240 n sin (21.541Ã,Â °) = 653.65 n r = 654 n 21.5ã , Â ° w 37. p = 37 p 12 x = 37 (720 n) 12 = 220 n (b) p = 35 p p = 2.2 kn w y 12 x = 35 (720 n) 12 = 2100 n py = 2, 10 KN W 33. The directions of the two forces 150-n can vary, but the angle between these forces is always 50ÃÂÃÂ °. Problem Solution 2.97 The arm or door a load P and is supported by two cables as shown. Force 84 29 lb: force: fx = + (29 lb) 116 f = + (29 lb) 80 y 116 f = Ã ¢ â '' (50 lb) 28 x 100 96 fx = +21.0 lb w fy = +20.0 lb w fx = Ã ¢ ââ14.00 lb w fy = + (50 lb) 100 48 fy = +48.0 lb w 51-lb force: fx = + (51 lb) 102 F = Ã ¢ âÂ '(51 lb) 90 y 102 fx = +24.0 lb w fy = Ã ¢ â it is 45.0 lb w 24. In any case, determine the voltage in each cable. N Solution Problem 2.36 Knowing that the voltage in the AC rope is 365 N, determine the result of the three forces exerted to point C of the post BC. Free body diagram solution: pulley c ÃžÂ £ fx = 0: o ÃžÂ £ fy = 0: o tacb (cos25Ã,Â ° Ã,Ââ 'cos55Ã,Â °) Ã ¢ Â' pcos55 , Â ° = 0.58010TACB TACB (sin 25Ã,Â ° + sin55Ã,Â °) + psin55Ã,Â ° Ã ¢ Â Â'1800 n = 0 1,24177tacb + 0.81915p = 1800 n (1) (2) (a) in a replacement equation (1) equation (2): 1,24177tacb + 0.81915 (0,58010tacb) = 1800 n Those: (b) Using (1), TACB = 1048.37 N TACB = 1048 N W P = 0 , 58010 (1048.37 n) = 608.16 n p = 608 n w 73. Free body diagram in A: the forces applied in A are: tab, tac, tad and w where w = wj. To express the other forces in terms of I, J, K, write JJJG AB = Ã ¢ Â '(450 mm) I + (600 mm) J JJG AC = + (600 mm) J Ã ¢ Â Â '320 mm) K JJJG AD = + (500 mm) I + (600 mm) J + (360 mm) K JJJG = 750 mm AC = 680 mm AD = 860 mm and T = T = T AB = T (Ã¢ Â ~ 450 mm) i + (600 mm) j AB AB AB AB AB AB AB AB AB AB AB AB AB AB AB AB AB AB AB AB AB AB Â"45 60 750 mm JJG = Â"75 i + 75 jÃ ⑤ teTAB T = T AC = T AC T (600 mm) (320 mm) j AC AC AC AC AC AC AC AC AC AC AC AC AC AC AC AC AC AC AC AC AC AC AC AC 680 mm = Â "600 mm = Â" " 32 k Â"68 68 68 Â"AC JJG Â"T = T = T AD = T (500 mm) i + (600 mm) j+ (360 mm) k AD AD AD AD AD AD AD AD AD AD AD AD AD AD AD 860 mm 103. SOLUTION PROBLEM 2.18 For the probe post. Knowing that the voltage in the AD Ã¨ cable is 429 N, determine the components of the force exerted on the D plate. SOLUTION Knowing that P = 360 N, determine the voltage (a) in the AC cable, (b) in the BC cable. Determine the voltage of each cable. See problem 2.101 for figure and analysis leading to linear algebraic equations (1), (2) and (3). PROBLEM 2.5 A pallet is pulled from the ground by means of two ropes as shown in the figure. y x y z y PROBLEM 2.83 The origin a coordinate system acts a force F of magnitude 210 N. F = +106 lb 28 inches. SOLUTION PROBLEM 2.44 Two cables are tied together with C and loaded as shown. Knowing that the connection Ã¨ is in equilibrium and that P = 500 lb and Q = 650 lb, determine the SOLUTION magnitudes of the forces exerted on the A and B rods. Using the laws of cosines and sinuses: P2 = (120 N) 2 + (160 N) 2 (120 N) (160 N) cos 25ÃÂ° P = 72,096 N E sinIÂ± = sin 25ÃÂ° 120 N 72,096 N sinIÂ± = 0.70 343 ÃÂ± = 44,703ÃÂ° P = 72.1 N 44.7ÃW 21. Note that the plate weight¨ equals in magnitude the force P exerted by the support at Point A. Knowing that P = 60 N and Q = 48 N, determine by trigonometry the magnitude and direction of the resultant of the two forces. Free body diagram: C Triangle of strength The triangle of strength is isosceles with (a) 2Ã2 =180ÃÂ° Ã ④ Â 85ÃÂ° Ã2 = 47,5ÃÂ° P = 2 (800 N) cos 47,5ÃÂ° =1081 N (b) Since P > 0, the solution is correct. SOLUTION 60-lb Force: 80-lb Force: 120-lb Force: and Fx = (60 lb) cos20ÃÂ° =)bl)bl 08(= yF bl 000.04 = °ÂÃ06soc)bl 08(= xF bl125.02 = °ÂÃ02 nis)bl 06(= yF bl = 69,282 lb Fx = (120 lb)cos30ÃÂ° = 103,923 lb Fy = Ã ④ ÂÂ(120 lb)sin30ÃÂ° = ÃÃÂ60,000 lb Rx = ÃÂ£Fx = 200,305 lb Ry =Â£Fy = 29,803 lb R = 200,305 lb)2 + (22 2 = 202,510 lb Further: tanÃÂ± = 29,803 200,305 ÃÂ± = tanÃ ④ Â Â1 29,803 200,305 = 8.46ÃÂ° R = 203 lb 8.46ÃÂ° W 40. z z z z x PROBLEM 2.84 A force F of magnitude 1200 N acts as the origin of a coordinate system. Knowing that P must have a 600-N component perpendicular to the AB member, determine (a) the magnitude of the force P, (b) its component along the AB line. 60 lb force: Force: Force: Then and Fx = (60 lb)cos 20ÃÂ° = 56,382 lb Fy = (60 lb)sin 20ÃÂ° = 20,521 lb Fx = (80 lb)cos 95ÃÂ° = Ã6Â9725 lb Fy = (80 lb)sin 95ÃÂ° = 79,696 lb Fx = (120 lb)cos 5Ã Â° = 119,543 lb Fy = (120 lb)sin 5Ã 6 lb tanÃÂ± = 110,676 168,953 tan ÃÃeÂ± = 0.65507 ÃeÂ± = 33.228ÃeÂ° R = 202 lb 33.2ÃoW 41. Knowing that the voltage in the cable AD Ã¨ 520 N, determine the weight of the plate. PROBLEM 2.24 Determine the components x and y of each of the forces shown. PROBLEM SOLUTION 2.48 Knowing that ÃÂ± = 20ÃÂ°, AC, (b) in the BC rope. PROBLEM 2.64 Collar A Ã¨ connected as shown at a load of 50 pounds and puÃ² slide on a horizontal rod without friction. PROBLEM 2.113 In an attempt to move through a slippery ice surface, a 175-pound man uses two AB and AC ropes. Free-body graph ÃÂ£Fx = 0: TACB cos 15ÃÂ°ÃÂÂTACB cos 25ÃÂ°Ã ④ ÂÂ (20 lb)cos 25Ã (304.04 lb)sin 15ÃÂ° + (304.04 lb)sin 25ÃÂ° +(20 lb)sin 25ÃÂ° Ã¢ Â ÂW = 0 W = 215.64 lb (a) (b) W = 216 lb W TACB = 304 lb W 59. PROBLEM 2.113 (Continued) Replacing the expressions obtained for TAB ,TAC ,zero, the coefficients a give the following equations: and W; factoring i, j and k; and equating each of From i: Ã ÷ ÂÂ 15 T Ã ¯ ÂÂ 15 T + 16 N = 0 (1) 25 AB 19 AC 34 Da j: 12 T + 10 T + 30 N Ã ④ ÂÂ (175 lb) = 0 25 AB 19 and 34 DA K: 16 and 25 ab Ã ¢ Ã ¢ Ã ¢ â € ¢ 6 A = 0 19 and AM The solution of the resulting set of equations gives: TAB = 30.8 lb; TAC = 62.5 lb W 131. PROBLEM 2.117 For the cable system of problems 2.107 and 2.108, determine the voltage in each cable knowing that SOLUTION P = 2880 N and Q = 576 N. W = mg = (200 kg) (9.81 m/s2) =1962 N TAC without 15°Â° = TBC without 105°Â° = 1962 N without 60°Â° (a) (b) TAC = T (1962 N) without 15°Â° without 60° (1962 N) without 105° TAC = 586 N W T = 2190 N W TBC = without 60° BC 50. Other forces in terms of unit vectors i, j, k, write JJG DA = (18 in.) j+ (22 in.) k DA = 28.4 25 in. 48 25 36 TAC = Ã¢Â¨ TACi + 65 TAC jÃ¢Â¨ 65 TACk 65 Load P: P = P j For the resultant to be directed along OA, i.e. X-axis R = 0: Ã¢Â£F = (72 lb) Ã¢Â¨ 36 TÃ¢ÂÂ2 = 0 T =130.0 lb W z 65 AC AC 101. SOLUTION The forces applied to A are: TAB , TAC , TAD and W where P = Pj. To express the other forces in terms of unit vectors i, j, k, we write JJJG AB = Ã¢Â¨ (36 in.) i + (60 in.) jÃ¢Â¨ (27 in.) k AB = 75 in. The pulley is held in the indicated position by a second CAD cable, which passes over the pulley A and supports a load P. Knowing that the voltage in the AB cable is 183 pounds and that the result of the load P and the forces exerted at A by the two cables must be directed along OA, determine the voltage in the AC cable. PROBLEM 2.122 Knowing that the voltage in the AC cable of the system described in problem 2.121 is 150 N, determine a) the amount of force P, b) the weight W of the tank. PROBLEM 2.52 Two forces P and Q are applied as shown to an aircraft connection. Knowing that a vertical load of 200 pounds P is applied to ring A, determine the voltage in each of the three cables. ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE ARE A Using the x and y axes shown: a) Set Ry = 0 in Eq. 2) Rx = éÂ£Fx = TAC sin10° + (50 lb) cos35° + (75 lb) cos60° = TAC sin10° + 78,458 lb Ry = = (50 lb) sin35° + (75 lb) sin60° Â"TAC cos10° Ry = 93.631 lb Â"TAC cos10° 93.631 lb Â"TAC cos10° = 0 (1) (2) (b) Replacement of TAC in Eq. (1): TAC = 95.075 lb Rx = (95.075 lb) sin10° + 78.458 lb = 94.968 lb R = Rx TAC = 95.1 lb W R = 95.0 lb W 44. Free body diagram Ã¢Â£Fx = 0 Ã¢Â¤T sin30D + T sin30DÃ¢Â¢ Pcos 45Â° 200N = 0 For P = 200N we have, Ã¢0.5TCA + 0.5TCB + 212.13 Ã¢ 200 = 0 (1) ÃÂ£Fy = 0 T cos30Ã¤Â° cos30D is Psin 45 D = 0 0. PROBLEM 2.101 (Continued) Steady state: Ã©Â£F = 0: TAB + TAC + TAD + Pj = 0 Substituting the expressions obtained for TAB , TAC , and TAD and factoring i, j, and k: (Ã¢Â¢0.6TAB + 0.32 432TAC) i + (Ã¢Â¢Â¢Â¢0.8TAB Ã¢Â¢Â¢ 0.75 676 TAC 0.86 154TAD + P) j + (0.56 757TAC 0.50 769TAD) k = 0 Equals the coefficients of i, j, k to zero: by setting TAD = 481N 0.6TAB + 0.32 432TAC = 0 0.8TAB 0.75 676TAC 0.75 676TAC 0.75 676TAC 0,86 154 TAD + P = 0 0.56 757TAC = 0.50 769TAD = 0 in (2) and (3), and solving the resulting set of equations gives TAC = 430.26 N TAD = 232.57 N P = 926 N (1) (2) (3) W 108. Determine (a) the x, y and z components of the force exerted by the SOLUTION cable on anchor B, (b) the direction of the angles of this force. SOLUTION PROBLEM 2.56 A sailor is rescued with a boat chair suspended from a pulley that can roll freely on the ACB support cable and is pulled at constant speed by the CD cable. From the diagram F.B. of the collar A: Ã£F = 0: Nxi + Nzk + Pj + TABÃ©Â"AB = 0 Setting the coefficient j to zero dÃ With P Ã¢Â¤ (1.90 476y) TAB = 0 P = 341 N T = 341 N AB 1.90 476y Now, from the freebody diagram of the collar B: Ã©Â£F = 0: Nxi + Ny j+ Qk Â"TAB ÃÂ"AB = 0 By setting the coefficient k to zero dÃ E using the above result for TAB, we have Q Â"TAB (1.90 476z) = 0 Q = T z = 341 N (1.90 476z) = AB (1.90 476) and 151. AC cable: T = T = T = T AC = T (Â¤48 inches.) i + (25 inches.) j+ (Â¤36 inches.) k AC AC AC AC AC AC AC 65 inches. PROBLEM OF ivac ivac ert ad atunetsos ¨Ã eralognatter artsaip anU 011.2 Showed. Plate weight = p = 768 n w 125. = 973.64 lb tac = 531.00 lb tad = 532.64 lb tab = 532.64 lb tab = 974 lb w tac = 531 lb w tad = 533 lb w tad = 533 lb w 142. authorization requested for Playback or display. Problem 2.13 A steel tank must be placed in an excavation. Problem 2.39 For the collar of problem 2.35, determine a) the required value of Î ± if the result of the three forces shown must be vertical, (b) the corresponding size of the resulting. Problem of the AC BC 2.57 solution for PROB cables. Problem 2,125 collars A and B are connected by a 525 mm long wire and can freely scroll to friction-free rods. From the analysis of the problem 2.125, in particular the results: y2 + z2 = 0.23563 m2 t = 0.23563 m2 t = 0.23563 m2 t = 341 n ab 1.90476y q = 341 n z y with and (a) y = 275 mm = 0.275 m, we obtain: z2 = 0.23563 m2 ã, '(0.275 m) 2 z = 0.40 m t = 341 n = 651.00 or e (b) or ab (1,90476) (0.275 m) q = 341 N (0.40 m) (0.275 m) Sheet = 651 N W Q = 496 N W 154. The full step-by-step solution for the problem in vector mechanics for engineers: it was given static and dynamic response, our top Engineering and expert technology expert on 03/16/18, 04:14 pm. Knowing that the voltage in the AC cable is 1.5 kips, determine the components of the force exerted A to the cable. P = 378 n w 146. (a) (b) vertical component psin35 Â ° = 300 lb p = 300 pounds p = 300 pounds sin35 Â ° pv = pcos35 Â ° = (523 lb) cos35 Â ° p = 523 lb w pv = 428 lb w 29. For both problems 2.125 and 2,126: (AB) 2 = x2 + y2 + z2 diagrams of the free collar body: here or (0.525 m) 2 = (0.20 m) 2 + y2 + z2 y2 + Z2 = 0.23563 m2, therefore, when y data, z is determined, jjjg ab now Ãž Â »ab = ab = 1 (0.20i Ã ¢ 'yj + zk) m 0.525 m = 0.38095i Ã ¢' 1.90476YJ + 1.90476ZK where Y and Z are in a unit of meters, m. Knowing that the force exercised on the man from the icy surface is perpendicular to that determine the tension in each string. Problem 2.106 A 1600 lb case is supported by three cables as shown. The resolution simultaneously gives , (1) (2) (3) ADT = 14.42 lb; TDB =. =. = 13.27 lb W 113. PROBLEM 2.111 A transmission tower is held by three guy wires attached to a pin at A and anchored by bolts at B, C, and D. SOLUTION JJJG EB = (270 mm)i ¢ÃÂÂ (400 mm)j+ (600 mm)k EB = (270 mm)2 + (400 mm)2 + (600 mm)2 = 770 mm F = FÃ»ÂEB JJJG = F EB EB = 385 N [(270 mm)i ¢ÃÂÂ (400 mm)j+ (600 mm)k] 770 mm F = (135 N)i ¢ÃÂÂ (200 N)j+ (300 N)k Fx = +135.0 N, Fy = ¢ÃÂÂ200 N, Fz = +300 N W 89. Force x Comp. PROBLEM 2.96 (Continued) Since R is vertical, the coefficients of i and k are zero: i: ¢ÃÂÂ 320 T + 32.40 + 250 T = 0 (1) 680 AB 650 AD k: 360 T + 25.920 ¢ÃÂÂ 360 T = 0 (2) 680 AB 650 AD Multiply (1) by 3.6 and (2) by 2.5 then add: ¢ÃÂÂ 252 T 680 AB +181.440 = 0 TAB = 489.60 N Substitute into (2) and solve for TAD : 360 (489.60 N) + 25.920 ¢ÃÂÂ 360 T = 0 680 650 AD TAB = 490 N W TAD = 514.80 N TAD = 515 N W 100. Compute the following distances: OA = (600)2 + (800)2 =1000 mm OB = (560)2 + (900)2 =1060 mm OC = (480)2 + (900)2 =1020 mm 800 800-N Force: 424-N Force: 408-N Force: Fx = +(800 N) 1000 F = +(800 N) 600 y 1000 F = ¢ÃÂÂ(424 N) 560 x 1060 F = ¢ÃÂÂ(424 N) 900 y 1060 F = +(408 N) 480 x 1020 F = ¢ÃÂÂ(408 N) 900 y 1020 Fx = +640 N W Fy = +480 N W Fx = ¢ÃÂÂ224 N W Fy = ¢ÃÂÂ360 N W Fx = +192.0 N W Fy = ¢ÃÂÂ360 N W 25. SOLUTION PROBLEM 2.20 Two forces P and Q are applied to the lid of a storage bin as shown. ¢ÃÂÂ ¢ÃÂ Â SOLUTION PROBLEM 2.124 Knowing that the tension in cable AE of Prob. Free-Body Diagram Force Triangle Law of sines: TAC = TBC = 400 lb sin60Ã°Â sin 40Ã°Â sin80Ã°Â (a) T = 400 lb (sin 60Ã°Â) T = 352 lb W AC sin80Ã°Â AC (b) T = 400 lb (sin 40Ã°Â) T = 261 lb W BC sin80Ã°Â BC 46. Cable AB: TAB =183lb JJJG T = T Ã»Â = T AB = (183 lb) (¢ÃÂÂ48 in.)i +(29 in.)j+(24 in.)k AB AB AB AB AB TAB = ¢ÃÂÂ(144 lb)i + (87 lb)j+ (72 lb)k JJJG 61in. Using the force triangle and the laws of cosines and sines: We have: Ã³Â =180Ã°Â ¢ÃÂÂ (50Ã°Â + 25Ã°Â) =105Ã°Â Then R2 = (4 kips)2 + (6 kips)2 ¢ÃÂÂ 2(4 kips)(6 kips)cos105Ã°Â = 64.423 kips2 R = selbac eerht eht fo hcae ni noisnet eht enimreted ,011.2 dna 901.2 smelborP fo etalp ralugnatcer eht roF 511.2 MELBORP NOITULOS .kooh a ot nwohs sa deilppa era secrof owT 1.2 MELBORP NOITULOS .17 W bl 0.051= T W bl 002 = T 4)bl 0006(1 = T)bl 006(ÂÂÃ¢ T4 3)bl 006(1 = T 0 =)bl 006(Â Â = zÂ˜ N 052ÂTE33(= F zF + yF + xF = F 2 2 2 NIGHTS .ni 51= x muirbilique NOITULOS eht niatniam ot deriuqer P ecrof eht fo edutingam eht enimreteD .12.2 melborP fo secrof eerht eht fo tnatluser eht enimreteD 13.2 ELBORP NOTIULOS .122 ÂT⟨Â⟨Â⟨Â⟨Â⟨Â⟨Â⟨Â⟨Â⟨Â⟨Â⟨Â⟨31 T 2.7 Â⟨Â⟨CAT84.0⟩ + BA 71 ÂT⟨T 9 ÂTRIDτÂΓ¢ + ÂT⟨j ÂΓ⟨T⟨P + DAT 31 ÂλÂ¢ CAT46.0 Â⟨Â³ ◄Ã¢ BAT 71 ÂTΓÂΓÂΓÂTΓ31 + CAT6.0 + BAT 71 Â³Â¢ 6.9 ÂT¢ 21 ÂRIGHT³¢ ÂΓÂΓÂΓIÂT¢DAT 31 + CAT6.0 + BAT 71 Â³ÂTΓÂΓÂΓÂΓÂΓÂT¢ 5 8 ÂRIGHT ³Â¢ 31 31 31ÂTΓΓ¢ :k ,j ,i gnirotcaf dna 0 = FÂ£Ãτ .qE eht otni gnitutitsbuS DA DAT = DAÂ"ÃTTO DAT = DATT ÂT¢ k 2.7 ÂλÂTΓj 6.9 ÂTΓi 5 ÂλΓ⟨JJ46.0⟩ • 477717171713714472121212172127272172172105721721056421272127272270455 = CA mm 086 = BA 8 ÂλÂΓÃ¢ ÂT¢ - 052(= DA GJJJ k)mm 063(ÂλÂΓj)mm 084(ÂλÂΓI)mm 052(= DA GJJJ k)mm 063(+j)mm 084(ÂTI)mm 054(= CA GJJ k)mm 063(+j)mm 08 4(ÂλÂτÃ¢ i)mm 023(ÂTΓE = BA :suhT :A ydoB eerF 0 = jP + DAT + CAT + BAT :0 = FÂ£ÃTO GJJ :evah eW .nwohs sa stnemegnarra yellup-dna-epor lareves yb detroppus si etarc bl-006 A 76.2 MELBORP .selbac owt eht secyb A ta detrexe rof eht fo tnatluser eht fo noitcerid dna edutingam eht enimreted ,CA elbac ni bl 015 dna BA elbac ni bl 524 si noisnet eht taht gniwonK 39.2 MELBORP .02 W Â°Ã°Ãτ8.3 spik 30.8 = R Â Â Â°Ã°Ãτλ577.82 = Â±Ã±Ãτ+ Â ‡ 452 73184.0 =)Â±Ãτ+ Â°Ãτ52(nis Â°Ãτ501nis)Â±Ãτ+ Â°Ãτ52(nis spik 4620.8 = spik 4 dnA spik spik That the weight of the plate¨ 792 N. Z Problem 2.82 A force acts at the origin of a coordinate system in a direction defined by the angles Ã®Â // = 70.97 Â° and Ã®Â // = 144.9 Â°. Combines the two 150 n forces into a resultant force Q: Q = 2 (150 N) Cos25 Â° = 271,89 n Load equivalent to A: Using the law of cosines: (600 N) 2 = (500 N) 2 + (271.89 N) 2 + 2 (500 N) (271.89 N) COS (55 Â° + Î±) COS (55 Â° + Î±) = 0.132685 Two values for Î±: 55 Â° +± = 82,375 Î± = 82,375 Î± = 27.4 Â° 55 Â° + Î± = Ã¢'82,375 Â° 55 Â° 55 Â° + Î± Î± = 360 Â° Ã '82,375 Â° or Î± = 222.6 Â° for R 5 t Ã ¢ Å¾Å¾ I + Ã ¢ Å¾> 48 t Ã ¢ Å¾Å¾ j + Ã ¢ Å¾> 36 t Ã ¢ å¾ k = 0 Ã ¢ å¾åå "13 from Ã ¢ å¾Ã¿ Ã ¢ Å¾åå" 65 from Ã ¢ å¾Ã¿ Ã ¢ Å¾åå "65 from Ã ¢ å¾Ã¿ TDA setting = 429 n yielded, Ã ¢ å¾ Ã ¢ å¾ Ã ¢ å¾ Ã ¢ å¾ Ã ¢ å¾ Ã ¢ Å¾ fx = Ã ¢ '165.0 n, fy = +317 n, fz = +238 n w 93. knowing That both members are in voltage and that p = 6 kips and q = 4 kips, graphically determine the magnitude and direction of the resulting force exerted on the bracket using the law of the parallelogram, (b) the triangle rule. DC = 26.0 in. P = (600 n) [sin 40 Â ° sin 25 Â ° 25 Â ° i + cos40 Â ° j + sin 40 Â ° cos25 Â ° k] = (162,992 n) i + (459.63 n) j + (349.54 n) K Q = (450 n) [COS55 Â ° COS30 Â ° I + SIN55-Â ° J Ã, 'COS55 Â ° SIN 30 Â ° K] = (223.53 N) I + (368.62 N) J Ã,' (129.055 n) k r = p + q = (386.52 n) i + (828.25 n) j + (220.49 n) k r = (386.52 n) 2 + (828.52 n) 2 + (828.52 n) 2 + (220.49 n) 2 + (220.49 n) 2 = 940.22 n r = 940 n w what is Ã®Â¸x = rx r ry = 386.52 n 940.22 n 828.25 n Ã®Â¸x = 65.7 Â ° w Ã®Â¸y = CosÃ® Â¸z = r rz r = 940.22 n = 220.49 n 940.22 n Ã®Â¸y = 28.2 Â ° w Ã®Â¸z = 76.4 Â ° W problem of solution 2.88 To move a destructive truck, two cables are Attacked to a and pulled by Winches B and C as shown. See the problem 2.109 for the figure and analysis that leads to linear algebraic equations (1), (2) and (3) below. (1) (2) Set (B) Because R must be vertical: RX = 0 in EQ. (1) 0 = p ¢ '177.860 lb p = 177.860 lb r = ry = 410 lb p = 177.9 lb w r = 410 lb w 157. This is not the :orebil :orebil oproC .111 w bl 00,31 = CDT = BDT ;bl 24.41 = ADT)3( )2( )1(, Ãd etnemaenaropmetnoc enoizulosir aL .ni 0.35 x .otset id (a) ÃÂ£ÂFx = 0: ¢ÃÂÂ 12 T + 4 (360 N) = 0 13 AC 5 TAC = 312 N W (b) ÃÂ£ÂF = 0: 5 (312 N) + T + 3 (360 N) ¢ÃÂÂ 480 N = 0 y 13 BC 5 TBC = 480 N ¢ÃÂÂ120 N ¢ÃÂÂ 216 N TBC =144.0 N W 159. (1) ¢ÃÂÂ (3): 59 AC 63 AD ¢ÃÂÂ 4 T + 300 lb ¢ÃÂÂ 10 T = 0 (1¢ÃÂ²Â) 21 AB 63 AD ¢ÃÂÂ 20 T ¢ÃÂÂ 500 lb ¢ÃÂÂ 50 T + P = 0 (2¢ÃÂ²Â) 21 AB 63 AD 5 T + 90 lb ¢ÃÂÂ 37 T = 0 (3¢ÃÂ²Â) 21 AB 63 AD Solving, TAB = 1081.82 lb TAD = 591.82 lb P = 2000 lb W 129. See Problem 2.99 for the figure and analysis leading to the following set of linear algebraic equations: ¢ÃÂÂ 45 T + 50 T = 0 (1) 75 AB 86 AD 60 T + 60 T + 60 T ¢ÃÂÂW = 0 (2) 75 AB 68 AC ¢ÃÂÂ 32 T 86 AD + 36 T = 0 (3) 68 AC 86 AD Setting TAD = 4.3 kN into the above equations gives TAB = 4.1667 kN TAC = 3.8250 kN W = 9.71kN W 106. PROBLEM 2.73 A gun is aimed at a point A located 35Ã°Â east of north. Determine by trigonometry (a) the magnitude and direction of the smallest force P for which the resultant R SOLUTION of the two forces applied at A is corresponding magnitude of R. (a) (Ã±Â + 30Ã°Â) + 60Ã°Â + Ã²Â =180Ã°Â Ã²Â =180Ã°Â ¢ÃÂÂ (Ã±Â + 30Ã°Â) ¢ÃÂÂ 60Ã°Â Ã²Â = 90Ã°Â ¢ÃÂÂÃ±Â sin(90Ã°Â ¢ÃÂÂÃ±Â) = sin60Ã°Â 425 lb 500 lb 90Ã°Â ¢ÃÂÂÃ±Â = 47.402Ã°Â Ã±Â = 42.6Ã°Â W (b) R = 500 lb R = 551 lb W sin(42.598Ã°Â + 30Ã°Â) sin60Ã°Â 15. ¢ÃÂ¥Â ¢ÃÂ£Â ¢ÃÂ¦Â TAB = (240 lb)i ¢ÃÂÂ (270 lb)j + (360 lb)k JJJG T = T Ã»Â = T AC = (425 lb) ¢ÃÂ¡Â(100 in.)i ¢ÃÂÂ(45 in.)j +(60 in.)k ¢ÃÂ¤Â AC AC AC AC AC ¢ÃÂ¢Â 125 in. Force Triangle Law of sines: TAC = sin35Ã°Â TBC sin75Ã°Â = 500 N sin70Ã°Â (a) T = 500 N sin35Ã°Â T = 305 N W AC sin70Ã°Â AC (b) T = 500 N sin 75Ã°Â T = 514 N W BC sin70Ã°Â BC 49. Determine the tension (a) in cable AC, (b) in cable BC. Thus, with the condition TAB = TAD = P and using the linear algebraic equations of Problem 2.131 with TAC = 150 N, we obtain (a) P = 454 N W (b) W = 1202 N W 147. PROBLEM 2.29 The hydraulic cylinder BD exerts on member ABC a force P directed along line BD. ¢ÃÂ¥Â ¢ÃÂ£Â ¢ÃÂ¦Â TAB = (200 lb)i ¢ÃÂÂ (225 lb)j + (300 lb)k JJJG T = T Ã»Â = T AC = (510 lb) ¢ÃÂ¡Â(100 Ã '(45 IN.) J + (60 IN.) K ÃÂ DELIVERS Â % AC AC AC AC Â© 125 IN. Diagram of the free body of point D: The forces applied to D are: TDB, TDC, TDA and p where p = pj = (36 lb) j. and TDA = TDA Ã Â"da = TDA = (0.55471i Ã '0.83206J) TDA JJG T = T ÃÂ" = t db = (Ã'0.30151i Ã' 0.90453J + 0.30151K) t jjjg t = t Ã Â"= T DC = (Ã '0.30151i '0.90453J Ãe (Ã'0.48TAB + 0.51948TAD) I + (0.8Tab + 0.88235TAC + 0.77922TAD Ã¢'W) J + (Ã'0.36TAB + 0.47059TAC Ã '0.35065TAD) K = 0 which equals zero the coefficients of I, J, K: Ã'0.48TAB + 0.51948TAD = 0.8Tab + 0.88235TAC + 0.77922TAD Ã¢'w = 0 Ã'0.36TAB + 0.47059TAC Ã '0.35065 TAD = 0 (1) (2) (3) Replacement w = 1600 lb in equations (1), (2), and (3) above and resolve the resulting set equations using conventional algorithms give, tab = 571 lb w TAC = 830 lb w tad = 528 lb w 117. Know that the gun barrel forms an angle of 40 Â° with the horizontal and that the maximum recoil force¨ of 400 n, determine (a) the X, Y and Z components of that force, (b) the A Ngles Ã®Â şx, Ã®Â şy and Ã®Â şz values by defining the direction of the recoil force. From the eq. (1) from the eq. (3) Ã'0.6tab + 0.32432tac = 0 Ã¢'0.8Tab Ã¢ '0.75676TAC Ã' 0.86154TAD + P = 0.56757TAC Ã '0.50769TAD = 0 TAB = 0.54053TAC TAD = 1.11795TAC (1) (2) (3) Substitution by card and TAD in terms of TAC in the TAC eq (2) dÃ Ã'0.8 (0.54053tac) Ã '0.75676TAC Ã' 0.86154 (1.11795TAC) + P = 0.2.1523TAC = P; P = 800 n T = 800 N AC 2.1523 = 371.69 N Substituting in expressions for card and TAD DÃ tab = 0.54053 (371.69 N) TAD = 1.11795 (371.69 N) Tab = TAD = 201 N, TAC = 372 N, TAD = 416 N W 109. x f = Ã'200 lb 30 in. This can be demonstrated by the CH methods. 4.) Free-body body diagram: pulley A Â£ fx = 0: Ã '2p Ã Ÿ Å ≈> 5 Ã Å Å Ÿ + pcos Â± = 00000000000000000000♠0.59655 Î± = Â± 53,377 Â° for Î± = + 53,377 = = f £Â Ã ¾Å¢Ã 182 2P ¢ Å¾> 16 Å¾¾ + P Pectoto 53.3777 ¢ å ° å Â £ f = 0: 2P ¢ Å¾ + ¢ ¢ ¢ ¢ ¢ ¢ ¢ ¢ ¢ ¢ å¾ 49.4 km 2.68 Rolvere Parti B e D DELL PROG 2.67, Supponendo C l'Estremitle Six Attpotata Lè Caschata. In triangolo Aob: AC = 700 ft f_ = 5650 lb cosyy = (5250 lb) That36.80 ° ° = 3150.0 LB Fx = ¢ ° '2418 LB W Fx = ¢' 2410 LB W Fx = ¢ '2410 ®âSy = + (5250 lb) Cos36.80 ° °.0 lb fz = ¢ '3124.8 lb fi fz EGAGE LB (b) Coscarks = FX = X FX = X FX = X FX = X13 CLUBLEX = 27,47 LB 1250 ¢ ®âSy = 36.9 ® lynz = fZ = f '2021.8 Lb 5250 Lb ° °¸N Del Ragzazo Sapendo Sapendo SURSER SELDCITIT ADA adNo adNa adhera Verticate DEACE DEACE DEACE DEPA ASCENTE DA 1800 LB. Problema 2.116 (Continua) Rolph Dhiasma di equizioni convenio conveni = 1325 n w tacks Tensione Enchie Corind of LOE SUNA CULETCUN SOA PHONEZOME DEELTTO DEELTTO DELOOD. SALL DEELY DEELLANT DEELTTE Somuzione 2.10 Due Forze Soo Appliate Come Mostrato Del Suppreto Del Corporation (750 n) Cos55 ° ° = 0 TACB = 1292.88 N TACB = 1293 N W (750 n) that 55) ° n , 'Q = 0 (1292,88 n) (that 25 â) 55)Luzione qillat Delated forza with Leggi Dei and sines: we have therefore e Î³ = 180 Â° Ã' (20 Â° + 10 Â°) = 150 Â° R2 = (48 N) 2 + (60 N) 2 Ã'2 (48 N) (60 N) COS150 Â° R = 104,366 N 48 N = = N sinÃžÂ ± sin150Ã,Â ° So: sinÃžÂ ± = 0.22996 ÃžÂ ± = 13.2947Ã,Â ° â â † = 180Ã,Â ° Ã ¢ Â'ÃžÂ ± Ã ¢ Â '80Ã,Â ° = 180Ã,Â ° Ã ¢ Â' Â Â'13.2947Ã,Â ° Ã ¢ Ã,Â ° Ã ¢ 80Ã,Â ° = 86.705Ã,Â ° R = 104.4 n 86.7Ã,Â ° W 22. (1) E (3): Ã ¢ Â '8 t + 0.6T + 200 n = 0 (1Ã ¢ â € Â €) 17 AB AC 9 T + 0.48T Ã ¢ Â Â '288 n = 0 (3Ã ¢ â € Â Â²) 17 AB AC Multiply (1Ã ¢ â € â € Â²) for 9, (3Ã ¢ â € Â €) for 8, and add: 9.24Tac Ã ¢ Â' 504 N = 0 Replace in (1Ã ¢ â € Â €) and solve per tab: TAC = 54,5455 n tab = 17 (0.6 ÃƒÂ- 54,5455 + 200) 8 tab = 494,545 n Replace voltages in EQ . (2) and solve for P: p = 12 (494,545 n) + 0.64 (54,5455 n) + 9.6 (520 n) 17 13 = 768.00 n 124. Knowing that the connection is balanced and that the magnitudes of the forces exerted on auctions A and B are Fa = 750 lb and fb = 400 lb, solution determines the magnitudes of P and Q. solution problem 2.121 a weight container w is suspended to, which can be connected AC cables And AE. 14 lb x = 68.6 in. Knowing that the size of P is 35 N, determine for trigonometry (a) the angle ÃžÂ ± requested if the resulting R of the two forces applied to the support must be horizontal, (b) the corresponding magnitude of R. solution problem 2.90 A rectangular plate is supported by three cables as shown. (N) 100 n 150 n 200 n +81.915 +63.393 Ã ¢ Â'163.830 Ã ¢ Â'57.358 Ã ¢ Â'135.946 â € Â Â Â Â 'Â Â Â' Â 'Â Â114.715 RX = Ã ¢ 18.522 RY = Ã ¢ 308.02 RX = rxi + y j = (Ã ¢ 18.522 n) i + (Ã ¢ 308.02 n) j ry tanÃžÂ ± = rx = 308.02 18.522 Ãž Â ± = 86.559Ã,Â ° r = 308.02 n sin86.559 r = 309 n 86.6.5 ° w 38. Knowing that and fz> 0, determine (a) the components of the force, (b) the angle Ã Ž6z. JJJG solution BD = Ã ¢ Â '(480 mm) I + (510 mm) J Ã ¢ Â' (320 mm) K BD = (480 mm) 2 + (510 mm) 2 + (320 mm) 2 = 770 mm JJG F = t Ãž "= T BD BD BD BD BD BD BD BD BD BD BD BD BD BD BD = (385 N) [Ã ¢ âÂ '(480 mm) I + (510 mm) JÃ ¢ Â Â Â Â 'Â Â Â Â' Â 'Â' Â Â Â Â Â Â Â Â '(320 mm) K] 770 mm) = Ã ¢ 70 mm) I + (255 N) JÃ ¢ Ã ¢ 2 5 n) [Ã ¢ 270 mm) I + (400 mm) JÃ ¢ 70 mm] (770 mm) = N) i + (200 n) jÃ, '(300 n) k r = fbd + fbe = ã,' (375 n) i + (455 n) jÃ, '(460 n) k r = (375 n) 2 + (455 n) 2 + (460 n) 2 = 747.83 n r = 748 n w cos Â¸X = Ã,375 n 747.83 n ÃžÂ¸x = 120.1 Â ° ... w cos Ã® ¸ = 455 n Ã®Â¸ = 52.5 Â ° w y cos Ã®Â¸z 747.83 n = Ã,460 n 747.83 n y Ã®Â¸z = 128.0 Â ° w 98. See problem 2.97. Knowing that the maximum voltage allowed in each cable is 800 N, the solution determines (a) the size of force majeure p which can be applied to C, (b) the corresponding value of Î ±. Solution problem 2.45 Two cables are linked together with C and loaded as shown. Problem 2.69 A Q load is applied to the C pulley, which can roll on the ACB cable. Solution problem 2.32 Determine the resulting of the three forces of the 2.23 problem. Solution that uses the Law of the Cosines: problem 2.15 for the support of the hook shown, determine through trigonometry the size and direction of the resulting of the two forces applied to the support. = Ã ¢ Å¾> 50 i + 60 J + 36 k Ã ¢ Å¾Å¾ TÃ ¢ Å¾Å "86 86 86 Ã ¢ å¾Ã¿ ad Ã ¢ Å¾ Ã ¢ Å¾ 104. Problem 2.105 A checkout is supported by three cables as shown. Knowing that the voltage in the cable is 385 N, determine the components of the force exerted by the cable on the support at D. Ã ¢ Å¾ The problem 2.123 (continued) Replace in za = 0, setting p = (ã, '200 lb) J, and setting the coefficients of I, J, k equal to Ã¯ â € â €, we obtain the following three equilibrium equations: from I: Ã, '17 .5 t + 4 t = 0 (1) 62.5 BAC 5 ad by J : Ã ¢ Å¾> 60 + 60 Ã ¢ Å¾Å¾ T + 3 T + 4 t Ã ¢ '200 lb = 0 (2) Ã ¢ Å¾Å "62.5 65 Ã ¢ Å¾Ã¿ bac 5 ad 5 ae From K: 25 t Ã ¢ '3 t = 0 (3) 65 bac 5 a and solve the system of linear equations that use conventional algorithms: tbac = 76.7 lb; Tad = 26.9 lb; Tae = 49.2 lb w 149. Ãž â £ f = 0: card + tac + tad + pj = 0 free body diagram in a: jjjg ab = Ã,20i Ã,100j + 25k jjjg ac = 60i ã, '100j + 18k jjjg ad = Ã,20i Ã ¢' 100j '74k jjg ab = 105 ft ac = 118 ft ad = 126 ft t = t Ãž Â »= t ab wiriamo ab ab ab ab¢ab¢¢Å¾ 4 20 5 ¢ TO ½ Å½ =¢Â 1 Â ¢ '21 I ' 21 J + 21 KY Åffertab JJJG T = T Â'= T AC AC AC AC AC AC Ã ¢ Å½> 30 50 9 Ã ¢ Å¾Å¾ = Ã ¢ Å¾Å "59 I Ã ¢ '59 j + 59 kÃ ¢ Å¾Ã¿tac jjjg t = t Ãž â» = t ad ad ad Â Â Â © > 10 50 37 Ã, å½å½ = Ã ¢ Å¾Å "'63 I Ã, '63 J ã, '63 KÃ ¢ Å¾Ã¿tad replacing in EQ. Ãž â £ f = 0 and factoring i, j, k: 128. Knowing that q = 0, that the tension in cable ad is 305 N. knowing that the balloon exerts a vertical force from 800-n to a, determine the Voltage in each cable. Ã ¢ â,¬ Ã ¢ Å¾ Ã ¢ Å¾ problem 2.112 (continued) Ã ¢ Å¾> 4 30 10 Ã ¢ Å¾Å¾ Ã ¢ Å¾Å "Ã ¢ '21 tab + 59 Tac Ã ¢ '63 tad Ã ¢ å¾i Ã ¢ å> 20 50 50 Ã ¢ Å¾Å¼ + Ã ¢ Å¾Å "Ã ¢ '21 tab Ã ¢ '59 tac Ã, '63 tad + pÃ ¢ å¾Ã¿ j + Ã ¢ å¾> 5 t + 9 t Ã ¢' 37 t Ã ¢ å¾an k = 0 Ã ¢ å¾å "21 AB 59 AC 63 to Å" Ã¿ Ã ¢ Å¾ Ã ¢ Å¾ setting of the coefficients of I, J, K, equal to zero: I: Ã, '4 t + 30 t Ã,' 10 t = 0 (1) 21 ab 59 ac 63 ad j: ã, '20 t ã, '50 t ã, '50 t + p = 0 (2) 21 ab k: 5 t 59 ac + 9 t 63 ad Ã, '37 t = 0 (3) Set TAC = 590 LB 21 AB in EQS. Solution Select the X axis to be a ... Â². = 55 n (3) Fixed the linear equation system with conventional algorithms: tab = 446.71 n TAC = 341.71 n p = 960 n w 119. Problem 2.16 Solve the problem. Y 156. DC = 26.533 in. Diagram of the free body of point D: The forces applied to D are: TDA, TDB, TDC and W where w = Ã,180.0 lbj. The framework diagram diagram triangle is smaller, TB (a) therefore must be perpendicular to the direction of the TAC. Solution (a) the parallelogram law: (b) triangle rule: problem 2.4 two structural members b and c are bolted to bracket A. Determine the range of Î ± values for which the size of the resulting forces acting in A is 600 N. It is vertical, (b) the corresponding size of the body diagram R. Free in A: Since TBAC = voltage in the cable bac, ne cheb = tac = tbac TBA Â »(¢17.5 in.) i 60 JBAB: = 62.5 in. If you want the test bench, look for the search box. Ã ¢ å ¥ Ã ¢ Å¾ â â â Ã ¢ Å¾ | TAC = (408 lb) i Ã ¢ '(183.6 lb) j + (244.8 lb) k r = tab + tac = (608) i Ã ¢' (408.6 lb) j + (544.8 lb) k and then: and r = 912.92 lb cosÃ®Â¸ = 608 lb = 0.66599 r = 913 lb w Ã®Â¸ = 48.2 Â ° 14 x 912.92 lb x cosÃ®Â¸ = 408.6 lb = Ã ¢ ¢ 0.44757 Ã®Â¸ = 116.6 Â ° w y 912.92 lb y cosÃ®Â¸ = 544.8 lb = 0,59677 ÃžÂ¸ = 53.4 Â ° 14 Â ° w 912.92 lb z 96. problem 2,125 collars a and b are connected by a 525 mm long wire And it can run freely on auctions without friction. Solution Determine the range of P values for which both cables remain thesis. Problem 2.134 Knowing that the voltage in the AC cable is 2130 N, determining the components of the force exerted on the Plate A C. Solution problem 2.67 A 600-pound case is supported by different rope chords and pulley as shown. y fx = +56.0 lb w f = +106 lb 45 in. Problem 2.14 For the support of the PROB hook. Problem 2.54 A welded connection is in balance under the action of the four forces shown. Ãž Â £ f = 0: tab + tac + tad + pj = 0 free body diagram a: jjjg ab = Ã,20i Ã ¢ '100j + 25k jjjg ac = 60i Ã ¢' 100j + 18k jjjg ad = Ã, '20i Ã,100jÃ,' 74k jjg ab = 105 ft ac = 118 ft ad = 126 ft t = t Ã® Â »= t ab wiriamo ab ab ab ab \ Ã ¢ å¾> 4 20 5 Ã ¢ å¾å¾ = Ã ¢ Å¾Å "Ã ¢ '21 I Ã, '21 J + 21 kÃ ¢ Å¾Ã¿tab jjjg t = t Ãž â» = t AC AC AC AC AC B AC Å "> 30 50 9 Ã ¢ Å¾Å½ = Ã ¢ Å¾Å "59 I Ã, '59 J + 59 kÃ ¢ å½Ã¿tac jjjg t = t Ãž â» = t ad ad ©> 10 50 37 ÃƒÅ½å½ = Ã ¢ Å¾Å "'63 I Ã , '63 JÃ, '63 KÃ ¢ Å¾Ã¿tad replacing the EQ. Ãž â £ f = 0 and factoring i, j, k: 126. solution problem 2.76 the angle between spring ac and the post from 30 Â °. Determines (a) the X, Y and Z components of the force exerted by the cable on the anchor C, (b) the angles Ã®Â¸x, Ã®Â¸y and Ã®Â¸z defining the direction of this force. Knowing that W = 1000 N, determine the size of P. (N) Y Comp. Problem 2.21 Determine the X and Y components of each of the forces shown. Problem solution 2.120 Three wires are connected to the D point, which is located 18 18 Problem 2.70 A 1800-N Q load is applied to the pulley C, which can² roll on the ACB cable. Ob = (28 inches) 2 + (45 inches) 2 = 53.0 in. (A) (B) 750 N = PSIN 20 Â° P = 2192.9 N PABC = PCOS20 Â° = (2192.9 n) Cos20 Â° P = 2190 n w PABC = 2060 N W 32. Know that Fa = 8 kn and solution fb = 16 kn, determine the magnitudes of the other forces. Problem 2.109 (continued) Setting the coefficient of I, J, K to zero: i: Ã '8 T 17 AB + 0.6Tac + 5 T = 0 13 AD (1) J: Ã' 12 T Ã¢' 0.64T Ã '9.6 T + P = 0 (2) 7 AB AC 13 AD K: 9 T + 0.48T Ã' 7.2 T = 0 (3) Make tac = 60 N in (1) and (3): 17 AB AC 13 AD Ã '8 T + 36 N + 5 T = 0 (1 Â²) 17 AB 13 AD 9 T + 28,8 N Ã' 7.2 T = 0 (3 AB) 17 AB Moltiply (1 Â²) of 9, (3) within 8, and add: 13 AD 554,4 N Ã '12.6 T = 0 T = 572,0 N Replaced in (1 Â²) and solve by card: 13 AD AD T = 17 Ã Å½> 36 + 5 Ã-572 Ã, Å Å ÛÅ≠t = 544.0 n Ab 8 Ã ÷ ÅÅ 13 Ã00 Å (2) and resolve for P: P = 12 (544N) + 0,64 (60 N) + 9.6 (572 N) 17 13 = 844,8 N Weight of the plate = P = 845 n w 123. Knowing that P must have a 720-N Component perpendicular to the AC pole, determine (a) the magnitude of the force P, (b) its component along the AC line. Let RX = 0 in EQ. (1): Ã'100cos Î± + 150cos (Î± + 30 Â°) = 0 Ã¢'100cos Â± +150 (cosÃ® Â± cos 30 Â° Ã¢ 'sin Î± Â± sin 30 Â°) = 0 29,904COS Î± = 75sinÃ® Â± TanÃ® Â± = 29,904 75 = 0,39872 Î± = 21,738 Â° Î 1,738 Â° Î± = 21.7 Â° W (B) Replacement for Î± in eq. (2) RY = Ã '300sin 21,738 Â° Ã'150sin51,738 Â° = Ã¢'228.89 n r = | ry | = 228,89 n r = 229 n w 42. Problem 2.80 Determine the magnitude and direction of the force F = (320 N) I + (400 N) J Ã '(250 N) K. OC = (40 inches) 2 + (30 inches) 2 102-lb Force: = 50,0 in. (Q Ã directed downward). Problem 2.74 Solve problem 2.73, assuming point A is 15 Â° north west and the barrel of the gun forms an angle of 25 Â° with the horizontal. Problem 2.1 The two forces are As shown in a hook. Ã ¢ Å¾Å "Ã ¢ Å¾Ã¿ y Ã ¢ Å¾Å" Ã ¢ Å¾Ã¿ y Ã ¢ Å¾Å "Ã ¢ å¾Ã¿ problem solution 2.66 2.66 The 200 kg case must be supported by the rope-and-pulley arrangement shown. Download file to mby-Beer 1. Since the resulting will be directed along OA, I.e., The X axis, we write r = 0: Ã Â£ f = (87 lb) + 25 t Ã¢ 'p = 0 y y tac = 130.0 lb from the problem 2.97. Determine the force components: 960 AC cable strength: FX = Ã '(365 N) 1460 1100 = Ã'240 n fy = Ã' (365 N) 1460 = Ã '275 N 24 500-N Force: FX = (500 N) 25 7 = 480 n fy = (500 N) 25 = 140 N 200-N Force: FX = (200 N) 4 = 160 N 5 3 and fy = Ã '(200 N) 5 = Ã '120 N RX = Ã Â£ FX = Ã'240 N + 480 N +160 N = 400 N RY = Ã Â£ fy = Ã'275 n +140 n Ã¢'120 n = Ã '255 r = r2 + R2 x y = (40) '255 N) 2 + (Ãe = 474.37 N TanÃ® Â± = 255 400 Î± = 32.5 Â° R = 474 N 32.5 Â° W 39. F = Ã'160.0 lb w x 50.0 in. Free body diagram Ã Â£ fx = 0¢'t sin30d + t sin30d Ã¢ 'pcos 45 Â° Ã' 200n = 0 per tca = 0 we have, 0.5tcb + 0.70711p Ã ' 200 = 0 (1) Ã Â£ fy = 0 T Cos30 Â° "Cos30d Ã¢ 'Psin 45D = 0; again Setting TCA = 0 yields, 0.86603tcb Ã'0.70711P = 0 (2) Adding equations (1) and (2) dÃ , 1.36603tcb = 200 then TCB = 146.410N and P = 179.315N Substituting for TCB = 0 in The equilibrium equations and resolution simultaneously give, Ã'0.5tca + 0.7077 1P Ã '200 = 0.86603TCA Ã' 0.70711P = 0 and TCA = 546.40N, P = 669.20N, then for both cables to remain tense, load P Must be in the range of 179.315 N and 669.20 N. Problem 2.97 The OA boom carries a load P and Ã supported by two cables as shown. Solution Problem 2.17 Resolve Problem 2.4 by trigonometry. Problem of the solution 2.33 Determine the result of the three forces of the problem 2.24. Using the law of the Cosines: TAC 2 = (3 KN) 2 + (4 KN) 2 Ã '2 (3 kN) (4 kN) (4 kN) (4 kN) COS 30 Â° TAC = 2.6643 KN Using the law of sines: SinÃ® Â± = Sin 30Ã Â° 3 kN 2.6643 Cd Cd 36 CA 95)²Â Ã 1(0 = T 01' Ã T 03 + bl 061'Ã DA 36 CA 95 :)3(" ¬â ¢Ã)1(.21 L °Â 3.43 Nk 66,2 = CAT °Â 3.43 = ±Î 731 :eneitto is ilanoiznevnoc imtirogla odnasu inoizauqe id etnatlusir emeisni'l odnevlosiR 3¢Ã DA 16 CA 31 BA 35)²ÂÂ Â Â Â Â Â Â Â Â Â Â¢Ã1(0 = N 0882 + T 84 ÂÂ¢Ã T 21 ÂÂ¢Ã T 84 ÂÂ¢Ã : Ãd N 675 = Q e N 0882 = P enoizatsopmi'LÂ Â Â Â Â Â Â Â¢Ã DA 16 CA 31 BA 35)1(0 = P + T 84 ÂÂ¢Ã T 21 ÂÂ¢Ã T 84 ÂÂ¢Ã :itneuges)3(e)2(,)1(iraenil ehcirbegla inoizauqe ella ecudnoc ehc isilana'l rep 611.2 amelborp li adev iS .etnatlusir alled etnednopsirroc azzednarg al)b(,elacitrev ais atatnup allus ataticrese etnatlusir azrof al ehc odom ni P azrof alled azzednarg al)a(airtemonogirt rep eranimreted ,°ÂÃ03 = ±ÂÃ ehc odnepaS .etartsom ezrof elled anucsaic id y e x itnenopmoc i eranimreteD 22.2 AMELBORP ENOIZULOS .pmoC x azroF :12.2 amelborP len itanimreted itats onos ezrof elled itnenopmoc I .N 675ÂÂ¢Ã = Q e N 0882 = P ENOIZULOS ehc odnepas ovac ingo ni enoisnet al eranimreted ,801.2 e 701.2 imelborP id ivac id ametsis li reP 811.2 AMELBORP .D a otroppus lus ovac lad ataticrese azrof alled itnenopmoc i eranimreted ,N 583 id ¨Ã ovac len enoisnet al ehc odnepaS .sborP id enoissimsart id errot al reP 911.2 AMELBORP ENOIZULOS .N 184 ¨Ã DA ovac len enoisnet al ehc odnepas A da enollap lad ataticrese P elacitrev azrof al eranimreteD .idarg 09 a ivac i art ologna'l eratsopmi ,CB ovac len aminim enoisnet anu reP)a(orebil oproc a ammargaid led azrof id olognairT .icillop 0,15 = 2)icillop 54(+ 2)icillop 42(= AO :eznatsid itneuges le eraloclaC .0 = yR ereva oirassecen ¨Ã ,elatnozziro ais R ©ÃhcniffA)a = R 37 x)1(N 04¢Ã = R 84 5 52 CA 0641 x)N 002(4 +)N 005(42 + T 069 = F Ã = R ENOIZULOS .721 W bl 3551 = P bl 49.2551= P bl 35.954 = DAT bl 21.854 = CAT ,gnivloS)²Â2¢Ã3(DA 36 0 = T 73 Â Â Â Â Â Â Â Â Â Â Â Â ÂÂ¢Ã CA 95 T 9 + bl 002 DA 36 CA 95)²ÂÂ¢Ã2(0 = P + T 05 ÂÂ¢Ã T 05 ÂÂ¢Ã bl (i) CDT96703.0ÂÂÂ¢ BDT96703.0Â Â E)deunitnoC(301.2 MELBORP .ni 86 = CA k).ni 23(+j).ni 06(= CA GJJ .99 Â ÂΓ¢ + Â Â ÂτÃτÂτÂ¢ ÂT¢ Â³³EτÃ¢ DA 056 BA 086 ÂTΓÂTΓT 084 ÂTΓÂT¢ 065.43 ÂTΓT 084 Â Â¢ DA 056 BA 086 ÂTΓI ÂTΓT 052 + 04.23 + T 023 ÂTΓÂ⟨Â⟨Â⟨Â⟩⟨Â⟩⟨R 056)k063 ÂTΓj084 ÂΓ⟨j0523⟩ (DAT = 057 :k j ,i ,gnirotcaf) on Fan³ = R .qE eht otni gnitutitsbuS DA DA DA DA DA DA T = Â"Ãτ T = T GJJJ CA CA CA CA CA CA CA CA CA CA CA)k063 + j084 Âλi054(45 = CA T = Â"Ãτ T = T 086)k063 + j084 Âλi023ÂT¢(BAT = GJJJ BA BAT = BAÂ"Ãτ BAT = BAT mm 056 = DA mm 057 = CA mm 086 = BA GJJJ k)mm 063(ÂλÂλâÃâj)mm 084(ÂTi)mm 052(= DA GJJJ k)mm 063(+j)mm 084(ÂTi)mm 054(= CA GJJJ k)mm 63(+j)mm 084(ÂT¢i)mm 023(ÂTO44(ÂTE374) = BA GJJ :suhT :evah eW .pmoC x ecroF :32.2 melborP ni denimreted erew secrof eht fo stnenopmoC .tnenopmoc lacitrev sti)b(,P ecrof eht fo edutingam eht)a(enimreted ,tnenopmoc noc ziroh N-523 a evah tsum P taht gniwonK .82 W N 079 = yP N 063 = W N 584 = P ÂτÂτÂ¢ 079 ÂTΓÂΓÂΓÂΓÂΓ027 ÂΓE¢ N 584 = ÂΓÂÂΓ079 ÂλΓy ÂTΓ02 7 ÂT¢ P = P N 584 =)b(ÂTΓÂΓ056 ÂTΓÂΓÂΓÂΓÂΓÂΓ079 ÂλÂΓN 523 = ÂTΓ056 ÂTΓExP = P ÂτÂΓÂΓ079 ÂT¢ Âλ¢ ÂTTE079 ÂTΓÂΓÂΓÂT¢ 056 ÂTΓP = xP ro)a(mm 079 = 2)mm 027(+ 2)mm 056(= CB .nwohs secrof eerht eht fo tnatluser eht enimreted ,Â°Ãτ04 = Â±Ãτ taht gniwonK 73.2 MELBORP .66 52 51 W bl 0.0 3 = P bl 05 = P elgnairT ecroF A ralloC :ydoB eerF)b(5.02 5.4 W bl 89.01= P bl 05 = P elgnairT ecroF A ralloC :ydoB eerF)a( )b(,.ni 5.4 = x)a(nehw ralloc eht fo .31 W N 2.37 = R Â°Ãτ52 nis N 53 Â 68.711nis = R W Â°Ãτ1.73 = Â±Ãτ Â°Ãτ268.711 = Â°ÃτXVIII831.73 ÂTΓÃ¢ Â°Ãτ52 ÂTΓÂΓÂΓÂ°ÃλXVIII1 = Â°ÃTOΓXVIII18 = Â°ÃTOTOTΓ+ Â±ETXVIII 31.73 = Â±Ãλnis 47306.0 = Â±Ãλnis N 53 N 05 Â°Ãλ52 nis = Â±Ãτ nis)b( )a(:senis fo wal dna elur elgnairt eht gnisU .ni 0.43 = CD k).ni 61(ÂT¢ j).ni 81(+ i).ni 42(= CD (Ã ¢ Â'0.83206TDA Ã ¢ Â '0.92308tdb Ã ¢ Â' 0.92308tdc + 36 lb) j + (0.23077tdb Ã ¢ Â'tdc) k = 0 Equand to zero the coefficients di I, J, K: 0.55471TDA Ã ¢ Â'0.30769tb Ã ¢ Â '0.30769tdc = 0 Ã ¢ â0ÂÂÂÂ.923077tdb Ã ¢ Â Â 'Â'0,23077tdc = 0.23077tdc (3) confirms chetdb = tdc. From problems from 9 chapters in Vector Mechanics for Engineers: static and dynamics have received reply, more than 47804 students viewed a complete response step by step. Rx = ÃžÂ £ fx = p + (200 lb) sin 40Ã,Â ° Ã ¢ Â '(400 lb) cos40Ã,Â ° rx = p Ã ¢ ââ177.860 lb ry = ãž za £ FY = (200 lb) COS40Ã,Â ° + (400 lb) Sin 40Ã,Â ° RY = 410.32 LB (A) To be vertical, R must have RX = 0. D D Solution problem 2.72 mines (a) the X components, Y and Z of Force 450-N, (b) the angles Ãž îœx, Ãž cm, and suppose that tad = 0 and we write jjjg Ãž £ = 0: tab + tac + qj + (1200 n) i = 0 AB = Ã ¢ Â '(960 mm) Ã ¢ â' '(240 mm) J + (380 mm) K JJJG AC = Ã ¢ Â' (960 mm) Ã ¢ Â Â 'Â Â' Â Â Â Â Â Â Â Â Â 'ÂŽ ÂŽ ÂŽ ÂŽ ÂŽ ÂŽC = 1040 mm 48 i Ã ¢ nâ t = t Ãž " = T ac = Ã ¢ âžâ> Ã ¢ âÂ '12 i Ã ¢ Â' 3 JÃ ¢ Â Â ÂŽ ÂŽ ÂŽ ÂŽ ÂŽ ÂŽ ÂŽ24 k Ã ¢ t AC AC AC Ã ¢ 2Â taking into account I, J, K and fixing each coefficient equal to Ã â † is obtained: I: Ã ¢ Â '48 t Ã ¢ Â' 12 t +1200 N = 0 (1) 53 ab j: Ã ¢ âÂ '12 t 13 ac Ã ¢ Â' 3 t + q = 0 (2) 53 ab 13 ac k: 19 t Ã ¢ Â '' 4 T = 0 (3) 53 AB 13 BC The solution of the resulting system of linear equations using conventional algorithms: 120. Forz solution A of 40 pounds: FX = + (40 lb) COS60Ã,Â ° FX = 20.0 LB W FY = Ã ¢ Â '(40 lb) Sin 60Ã,Â ° Fy = Ã ¢ Â'34, 6 lb w 50 lb strength: fx = Ã ¢ âÂ '(50 lb) sin50Ã,Â ° fy = Ã ¢ Â' (50 lb) COS50Ã,Â ° FX = Ã ¢ Â'38.3 lb w fy = Ã ¢ Â Â'60 lb force: fx = + (60 lb) cos25ã, fy = + (60 lb) sin 25ã, fx = 54.4 lb w fy = 25.4 lb w 27. problem 2.103 A 36 lb triangular plate is supported by three threads as shown. Problem 2.125 (continued) So from of the problem, and y =155 mm = 0.155 m z2 = 0.23563 m2 ¢ÃÂÂ (0.155 m)2 z = 0.46 m (a) T = 341 N AB 0.155(1.90476) = 1155.00 N or and TAB = 1155 N W (b) or Q = 341 N(0.46 m)(0.866) (0.155 m) = (1012.00 N) Q =1012 N W 153. Using the triangle rule and the law of sines: (a) 75Ã°Â + 40Ã°Â + Ã±Â = 180Ã°Â Ã±Â = 180Ã°Â ¢ÃÂÂ 75Ã°Â ¢ÃÂÂ 40Ã°Â = 65Ã°Â 800 lb = T2 T =853 lb W sin 65Ã°Â sin 75Ã°Â 2 (b) 800 lb = R R = 567 lb W sin 65Ã°Â sin 40Ã°Â 9. DA DBDB DB DB DB DB SOLUTION By Symmetry TDB = TDC The forces applied at D are: PROBLEM 2.103 A 36-lb triangular plate is supported by three wires as shown. ¢ÃÂÂ 15 T ¢ÃÂÂ 15 T + 16 N = 0 (1) 25 AB 19 AC 34 12 T 25 AB + 10 T 19 AC + 30 N ¢ÃÂÂ (175 lb) = 0 34 (2) 16 T ¢ÃÂÂ 6 T ¢ÃÂÂ (45 lb) = 0 (3) 25 AB 19 AC Solving the resulting set of equations simultaneously gives: TAB = 81.3 lb W TAC = 22.2 lb W 132. two Free-Body Diagram of Connection ÃÂ£ÂF = 0: 3 F ¢ÃÂÂ F ¢ÃÂÂ 3 F = 0 x 5 B C 5 A With FA = 8 kN FB =16 kN F = 4 (16 kN) ¢ÃÂÂ 4 (8 kN) F = 6.40 kN W C 5 5 C 3 3 ÃÂ£Â Fy = 0: 3 ¢ÃÂÂ FD + 5 FB ¢ÃÂÂ 5 FA = 0 3 With FA and FB as above: FD = (16 kN) ¢ÃÂÂ 5 (8 kN) 5 FD = 4.80 kN W 56. 2.10, determine by trigonometry (a) the magnitude and direction of the smallest force P for which the resultant R of the two forces applied to the support is horizontal, (b) the SOLUTION corresponding magnitude of R. SOLUTION (a) PROBLEM 2.30 The guy wire BD exerts on the telephone pole AC a force P directed along BD. 2.123 is 75 lb, determine (a) the magnitude of the load P, (b) the tension in cables BAC and AD. This textbook survival guide was created for the textbook: Vector Mechanics for Engineers: Statics and Dynamics, edition: 11. PROBLEM 2.46 Two cables are tied together at C and are loaded as shown. PROBLEM 2.120 (Continued) JJJG T = T Ã»Â = T DA and DA Da DA Da DA = (0.63324 j + 0.77397k)TDA JJJG T = T Ã»Â = T DB DB DB DB DB DB DB = (¢ÃÂÂ0.70588i + 0.52941j ¢ÃÂÂ 0.47059k)TDB JJJG T = T Ã»Â = T DC Equilibrium Condition with DC DC DC DC owt ,kcurt dekcerw a evom ot redro nI 78.2 MELBORP NOITULOS .B ta etalp eht no detrexe ecrof eht fo stnenopmoc eht enimreted ,N 804 si BA elbac ni noisnet eht taht gniwonK .811 CA31 T 4 ÂÂÃ BA 35 T 91 :k CA 31 BA 35)2(N 081 = T 3 + T 2 1 :j CA 31 BA 35)1(N 042 + T 21 + T 84 = P: i:sevig âÃÃ lacquer tneiciffeoc hcae gnittes dna ,k ,j ,i gnirotcaf ,0 = AFÂ£Ã otni gnitutitsbuS k)N 55(ÂÂÃ¢ j)N 081(+ i)N 042(ÂÂ Ã¢ = mm 0221 DA DA DA]k)mm 022(69ÂÂÃ¢([N 503 = Â Â113131313131111111111111111111111111111111111111111111111111111111111111111111211111111111111111111111111111111111111111111111111111111111111111111111111 â âÃateÂ¢ T = CA T = JJJJ Â â"ÃateT = T Â Â1Â¢ 35 35 35 ÂÂ¢ BA BA BA BA BA ÂÂÂÂ¢ k 91 + j 21 Â21 ÂââÂÃ¢ T = BA B = Â"BA T = T mm 0221= DA mm 0406= CA 001= mm 01= BA GJJ k)mm 022(Â222000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000 ÂAPPURTENANCEÃÃÂ¢ i)mm 069(Â10000000000000000000000000000000000000000000000000000000000000000000000000 487)Â°Ãê54 + Â°ÃÃ52(nis = N 006 Â²ÃÃnis senis fo waL)b(W N 487 = P N 20.487 = P)Â°ÃÃ82(soc)057()006(2)057(+2)006(2P senisofo waL)a006(2P senisofooL)a (elgnairT ecroF margaiD ydoB-eerF .ylno daolnwod rof elbaliava dna tamrof droW ro FDP a ni semoc launaM snoituloS .441 W bl 4.89 = CDT W bl 4.89 = BDT W bl 7.911 = ADT ,sevig smhtirogla lanoitnevnoc gnisu snoitauqe fo tes gnitluser eht gnivlos dna ,evoba)3 (dna ,)2(,)1(snoitauqE ni bl 081 = W gnitutitsbuS)3( )2( )1(0 = CDT95074.0 âÂÃ¢ BDT95074.0 â1074.0 0 = WÂ93777.0 0 0 = WÂ14925.0 + BDT140 925.0 + ADT42336.0 0 = CDT88507.0 + BDT88507.0ÂÂÂ¢:k j ,i fo stneiciffeoc eht orez ot gnitauqE k) CDT95074.0Â5074.0Â1Â¢ ADT79377.0(j)ADT79377.0 Â14925.0 + BDT14925.0 + ADT42336.0(i) CDT88507.0 + BDT88507.0 + BDT8507.0Â âââÂ¢ CDT + BDT + ADT:0 = FâÃÃjÂââÃÃ = W CDT) k95074.0 Â ÂââÃÂ¢ j14925.0 + i88507.0(= :itaccep ied ottiriD ammargaiD oproC-orebiL olognairT azrof °ÂÃ370,82 = ²ÂÃ 3 6,1 = ²ÂÃ nat °ÂÃ2062,61= ±ÂÃ 8,4 4,1 = ±ÂÃnat .BA olop la A a otassif ¨Ã ocinofelet ovac nU 7,2 AMELBORP ENOIZULOS .7 W °ÂÃ8,3 pik 30,8 = R °ÂÃ8,3 = ±ÂÃ ,pik 30,8 = R :omairusiM .2 OFARGARAP , .qE ni 0 = yR eratsopmI)a(e .D ni otroppus lus ovac lad ataticrese azrof alled itnenopmoc i eranimreted ,N 583 id ¨Ã ovac len enoisnet al ehc odnepaS .CB ovac len)b(,CA ovac len)a(ni enoisnet al eranimreted ,°ÂÃ06 = ±ÂÃ e N 005 = P ehc odnepaS ENOIZULOS alled orebil oproc a ammargaiD .etnatlusir alled etnednopsirroc azzeipma'l)b(,elacitrev ais olap lus ataticrese etnatlusir azrof al ehc odom ni P azrof alled azzeipma'l)a(airtemonogirt rep eranimreted ,°ÂÃ03 = ±ÂÃ ehc odnepaS .09 W spik 79,0+ = z) BAT(W spik 312,1+ = y) BAT(W spik 062Â1Â¢Ã = x) BAT(612,47 = BA"Ã BAT = BAT k63 + j54 + i567,64ÂÂ¢Ã tf 612,47 BA BA k)tf 63(+ j)tf 54(+ i)tf 567,64ÂÂ¢Ã(= BA = "Ã GJJJ :BA ovaC .59 z N 70,515 W °Âs Ã6,85 =âÃ 06125,0 = N 66,862 = zRâ,Ãsoc y N 70,515 R y W °ÂÃ4,33 =âÃ 74438,0 = =âÃsoc N 18,924 yR x N 70,515 R x W °ÂÃ8,97 =âÃ W N 515 = R 80771,0 = N 235 92¢Ã j)N 18,922(+ i)N 1 2.181(=]k°ÂÃ02 nis°Â021¢Ã j°ÂÃ05nis + i°ÂÃ02soc°ÂÃ05soc[)N 003(= Q k)N 16.433(+j)N 002(+ i)N 876.43¢Ã =]k°ÂÃ51soc°ÂÃ03soc + j°ÂÃ03nis + i°ÂÃ51nis°ÂÃ03soC 00¢Ã[)N 004(= P .2 .58 W bl 0,091¢Ã = yF W bl 0,63 = xF W bl 0,011= F °ÂÃ9,441soc)bl 0,011(= y ¢â Ãsoc F = yF °ÂÃ9,07soc)bl 0,011(= XÎÃsoc F = xF bl 0,011= F)28274Â Â Â Â Â Â Â Â Â Â Â Â0Â)b(F = bl 0.25Â Â¢Ã z ÃÃsoc F = zF)b(W °ÂÃ2.811= z Ã Ã Ã â Â¢Ã 28274.0ÂÂ¢Ã = z ¢â Ãsoc omailgecs ,0 < zF ehc otnemom laD)a(28274.0±ÂÃ = z ¢â Ãsoc 1= °ÂÃ âÃ 2soc + °ÂÃ9.441 2soc + D9.07 2soc z y x 1= â Ã 2soc + Ã 2soc + ââÃ 2soc ENOIZULOS .ni 001 DAT = DA DAT = DA ÂÂ¢Ã j 3 i 4 ÂÂ¢Ã j).ni 06(+ i).ni 08("Ã T ÂÂ¢Ã ÂÂ¢Ã ÂÂ¢Ã 56 + 56 ÂÂ¢Ã CABT = .otartsom emoc C e B illecirrev iad itarit e A arettel alla itassif onos 65 = Y ITAMSoc: Boa elgnairm Morf EHT EHT ENNE) b (, laciliv EB eta deTre yb finre eht @tbac fo r TNATluse @IST NO NORTH-THIST NOIST NA NORBAC @Thatlus @The , latnoziroh Eb Apart from Crerexe Secrof A HogurHer @rhd Sse. EBTE ATRBORT NEW THTLOPT NEW THTLOPT NEW THTLOPT NEW THTLOPPUS from the CBE EnerTE A 58.2 Melborp. NEWHS SA Noollab A Rehtet Ede Selbac Eritlos ..06 w oâht yb-± ± ± ± ± ± ± ±, 5.28 = ° ° Â] ¢ ¢ ¢ ¢â ¢ ¢â ± ± n + n + n + n + n et ÿ u ¢ k 52 + J 52 + I 52 Â'52 Â'â Â ¢ B'â # 0 = f £ ~ ~ you willâ € ¢ No.1 = n ~ 1 Â> ¢ tf 05 Boat 0 (+ J) tf 42 (t = B ¢ Ã t â t Â Ÿÿ ¢ k 91 Â'â ¢ ¢ J 91 + i 91 ¢ Cat ¢ ¢ Cat = GJJJ CA CA CA CA K) TF 25 (Â'â ¢ J) TF 07â € (n) tf 571 (Â ~ ¢ ÂÃ ¢ Â ¢ t = CO T = GJJJ Â ~ t = t = t Â ~ t ¢ ¢ J 03 + i ¢ n = n .Wurohs si nib Egt AppPo E.6 w lla Secuophs .68 W @els ° ãshas ãshas ãshas ãshas ãshas ° ãf Anything in 012 f Y09492.0Â'â ¢ = = ITA1 i ¢ w W ° ° ^ u w bl 0.26Â'â ¢ ¢ = yf 59083.0 = n 08 = xf = ¸ "¢ ¢ =) b (2) N 420 .481 (Â'â @ ÂÃâÃ ¢ 2) N 012 (Â'â @ ¢ ¢ w n 42 (= 2) n 012 (2F + 2f + 2f + = 2f n 420.481â ¢ ¢ ~ ¢ q: OS:

NEITulOS .84 CB ã ã ã nk CB WG 27.2 = T âwe ° ° ▪ 5.2 = t ° ° Read 89.1 = t) A (â ° Â â You will youh ug â âh.11 = CBT = = 65 ft (a) = 0.86154 Â®Â¸y = 30.51 Â ° FX = Ã,e'f sinÂ®Â¸y COS 20 Â ° = Ã, '(3900 lb) SIN 30.51 Â ° COS 20 Â ° FY = + F CosÂ®Â¸y = (3900 lb) (0.86154) fx = Ã,1861 lb w fy = +3360 lb w fy = + (3900 lb) sin 30.51 Â ° sin 20 Â ° fz = +677 lb w (b) cosÂ®Â¸ = fx 1861 lb = Ã,,0.4771 ÂžÂ¸ = 118.5 Â ° w x f 3900 lb x from above: ÂžÂ¸y = 30.51 Â ° CosÂ®Â¸ = fz = + 677 lb = +0.1736 Â®Â¸Y = 30.5 Â ° W Â®Â¸Z = 80.0 Ã, Â ° W F 3900 LB 80. Solution problem 2.65 Three forces are applied to a bracket as shown. P = (300 n) [Ã,cos30 Â ° sin15 Â ° 15 Â ° I + sin30ã, Â ° j + COS30 Â ° COS15 Â ° K] = Ã, '(67.243 N) I + (150 N) J + (250.95 n) k q = (400 n) [COS50 Â ° COS20 Â ° I + sin50-â ° j, 'COS50-Â ° sin 20 Â ° k] = (400 n) [0.60402i + 0.76604jã, '0.21985] = (241.61 n) i + (306.42 n) jÂ ¢ Â ¢' (87.939 n) k r = p + q = (174.367 n) i + (456.42 n) j + (163.011 n) k r = (174.367 n)) 2 + (456.42 n) 2 + (163.011 n) 2 = 515.07 n CosÂ®Â¸ = rx = 174.367 n = 0.33853 r = 515 n w Â®Â¸ = 70.2 Â ° w x r 515.07 n x ry 456.42 n cosÂ®Â¸ = = = 0.88613 ÂžÂ¸ = 27.6 Â ° w y r 515.07 n y cosÂ®Â¸ = rz = 163.011 n = 0.31648 ÂžÂ¸ = 71.5 Â ° w z r 515.07 n z 94. Determine the distance of the X solution for which The collar is balanced when P = 48 pounds. See the problem 2.116 for the analysis that leads to linear algebraic equations (1), (2), and (3) in the following: Ã, '48 t ã, '12 t ã, '48 t + p = 0 (1) 53 AB 13 AC 61 ad ã, '12 t ã,' 3 t + 36 t + q = 0 (2) 53 ab 13 ac 61 ad 19 t ã, '4 t ã,' 11 t = 0 (3) 53 AB 13 AC 61 Setup P = 2880 N and Q = Ã, '576 n DÃ: Ã, '48 t ã,' 12 t ã, '48 t + 2880 n = 0 (1 a) 53 ab 13 ac 61 ad Ã, '12 t ã, '3 t + 36 t ã,' 576 n = 0 (2 a) 53 ab 13 19 t ac 61 ã, '4 t ad ã, '11 t = 0 (3 ac 61) 53 ab 13 AC 61 Resolution of the announcement The resulting series of equations that use conventional algorithms: 139. 2.89, determine the voltages in the AB cables and knowing that the voltage in the AC cable is 54 N and that the result of the forces exerted by Three A to A cables must be vertical. (a) fx = ã, '(450 Cos 35 ° SIN 40 FX = Ã,'236.94 N = (450 N) SIN 35 ° MY = 258.11 N FX = Ã,'237 N My My 258 N W Fz = (450 N)cos35ÂÂ°cos40 Fz = 282,38 N Fz = 282 N W (b) cos cos cos cos cos Ã Â â¢ x = Ã Cases = Ã z = Fx = F Fy = F Fz = F -236,94 N 450 N 258,11 N 450 N 282,38 N 450 N X = 121.8Âz Based on the data provided, we could directly calculate D D D Â {\displaystyle D_{D}} y = 90 Â ④ ÂÂ 35 = 55 {\displaystyle D_{D}} , which it controls with the response obtained. Determine the weight W of the tank, knowing that the voltage in the AB Ã¨ cable is 6 kN. Free-body diagram of the connection ÂÂ£Fy = 0: Ã ÷ ÂÂF Ã ¯ ÂÂ 3 F + 3 F = 0D 5 A 5 B 3 or FB = FD + 5 FA Con FA = 5 kN, 5 Â ④ Â Â Â ÂÂ N W 57. Free body: Collar A Triangle of strength N2 = (50)2 Â ④ ÂÂ (48)2 =196 N =14,00 lb Similar triangles x = 48 lb 20 in. SOLUTION Using the law of cosines: R2 = (900N)2 + (600N)2 Â ④ ÂÂ2(900N)(600N)cos(135ÂÂ°) R =1390.57N sin(ÂÂ±Â, ④ Â Â30D) sin (135ÂÂ°) Using the law of sins: = 600N 1390.57N ÂÂ± ④ ÂÂ 30D = 17.7642ÂÂ° ÂÂ± = 47.764D R =1391N 47.8ÂÂ° W 19. 6603TCA + 0.86603TCB Â ÂÂÂ (1) and (2) give simultaneously, TCA =134.6 N W TCB 110.4 N W 52. The force components were determined in problem 2.22: Force x Comp. PROBLEM SOLUTION 2.35 Knowing that ÂÂ± = 35ÂÂ°, determine the result of the three forces shown. PROBLEM 2.63 Collar A Ã¨ connected as shown at a load of 50 pounds and puÂ² slide on a horizontal rod without friction. Knowing that the voltage in the spring Ã¨ of 40 lb, determine (a) the components x, y and z of the force exerted on the round plate at C, (b) the angles Ã, Ã, x, Ã, and Ã, z by defining the direction of the force at C. Determine the voltage in the string for each arrangement. SOLUTION a) Parallelogram law: b) Triangle rule: PROBLEM 2.3 Two structural elements B and C are bolted staffa A. (a) FAC = without 35Â Â° TBC without 50Â Â° 300 lb = 300 lb without 95Â Â° (b) FAC = without without P Ecrof Lacitrev EHT Enimreted, BL 048 SI BA EHT FI .LAUNAM SKIREVIZE ROF Noitide HT11 Scimanyd DNA SCISTAHCEM ROF SCINAHCEM RotceVâ Ã, / Â Ã. SNOITULOSâ Ã, / Â Ãemoh .sqe ni bl 048 = Bat Tes Ba 12) 3 (0 = T 73 âiĉ'â ¢ da 36 t 9: k ba 12) 2 (0 = p + T 05 â'â'âiÂ ¢ â'âãÂ ¢ T 02 â'â â'i 95 Ba 12) 1 (0 = t Â'â â' 4 Â'ÂÂ ¢: i: or j, i fo stneicffeoc eht gnžžzaÂžÿ ¢ â Ážžžžz € ba 12 ÂœÂž SlažážžÂ ¢ t 9 + t 5 Ážžžžžžžžžžžžžžžžžižž ¢ Cat 95 Â'âÂÂ ¢ Bat 12 â'â € âžžžžžžžžžžážÂ ¢ (¢ Cat 95 + Bat 12 â'âžâÂžžžžžžžžžžžžžžžžžžžžžžžžžžžžžžžžž ¢žžž â Â ÂžÂ ¢ ¢ â Â ŽÂ ¢ Â ¢. CDT = BDTTAHT Smrifernoc) 3 (Noitauqe 0 = CDT15103.0 7 = BL 63 + CDT35409.0 â'âÂ Fdt35409.0 â 'ÂÂ ¢ adt60238.0day ¢ 0 = Cdt15103.0 â 'ÂÂ ¢ Bdt15103.0.0533 K, J, I fo stneicffeoc eht orez ot gnitauqe 0 = k) CDT15103.0 Â'âi â Bdt15103.0 (+ j) bl 63 + CDT35409.0 Â'âčÂ bdt35409.0 Â'âêâ 11.0â'âi â ADT60236.0103.0 ADT1503.0 ADT1503.0 Â'âiZt15103.0 0 (: K DNA, J, I Gnirotcaf DNA CDT DNA, BDT, ADT ROF DENIATBO SNIISSPXE 0 = J) BL 63 (+ CDT + BDT + ADT: NOITIDOC MUIRBILIUQEE) DEUNITNOC (401.2 Melborp .tnatluser Eht Fo Eduting Team GnidNopserroc EHT) B (, Enilcni EHT FO TNATLUS EHT) A (Enimreted, 83.2 DNA CLOB EHT ROF 24.2 MELBORP NEHT .elbac EHT Gnola Rotcev TiNu EHT DNA ETROFP ERT SABAC HCAE NI EMAS EHT SID EHT: TNIH (.nwohs SA DEILPA ERA Q DNA P SECROF EHT EREHW, A TA DETCENNOC ERBAC EERHT 801.2 MELLOLOS .61 BL 312 = R BL 863 = P Congrulation) BL 524 (= R â (= R 524 (= p) B () a (.57 .851 W Bl 132 = CBT W BL 7.271 = CAF Â ° Â,05 nis bl 003 = T Â ° T gnitutitsbuS ÂÂÂ¢ 16 16 16 Â ÂÂ ◄ÂÂ¢ CA CA CA CA CA CA CA CA CA ÂλÂτ¢Â¢ k 4 ÂTTΓj 3 ÂλÂΓi 21 ÂλÂΓÂΓÂλÂΓÂΓÂΓT = CA T = GJJJ Â"Âτ T = T ÂλÂ¢ 35 35 ÂλÂ¢ BA BA BA BA BA BA BA ÂλÂτ³¢ k 91 + j 21 ÂTEi 84 ÂTEyrÂ³ET¢ ÂλT = BA T = Â"Â→T = T mm 0221= DA mm 0401 = CA mm 0601 = BA GJJJ k)mm 022(ÂλÂ¢ j)mm 027(+ i)mm 069(ÂτÂ¢ = DA GJJ k)mm 0 23(ÂλÂT¢ j)mm 042(ÂλÂΓi)mm 069(ÂλÂ¢ = CA GJJJ k)mm 083(+j)mm 042(ÂTi)mm 069(ÂTI34244244244242424742747377747777777777777777777777777777777777777777777777777777777.34 W N 326 = R N 326 = xR = R N 55.226 = xR 37 ÂλÂ¢ = x N 046 +)N 545.62(84 R sevig)1(.qE otni CAT rof gnitutitsbuS)b(W N 5.62 = CAT N 545.62 = CAT CA 37 0 = N 02 + T 55 Â³◄)∞◄). 2(.qE ni 0 = yR teS .bl 0525 si elbac taht ni noisnet eht dna ,gnol tf 07 si CA elbaC 87.2 MELBORP NOITULOS .CB enil gnola detcerid P ecrof a BA rebmem no strexe CB rednilyc ciluardyh ehT 72.2 MELBORP .nwohs sa sepor owt fo snaem yb dellup si elibomotua delbasid A 8.2 .97 W Â°Âτ7.601= zÂ˜ W Â°Âτ0.03 = y Â ∞ W Â°ÂτT88.56 = xÂ˜ W bl 74.11ÂT¢ = zF W bl 6.43 = yF W bl 83.61= xF bl 04 bl 5174.11- = bl 04 bl 146.4 3 = bl 04 bl 0383.61 = F zF F yF F xF = zÂ τ = y Â ∞ Âτ = xÂ τ soc soc)b(bl 5174.11ÂT¢ = zF Â Â°Âλ53nis)bl 0.02(ÂT¢ = Â°Âλλ53 nis hFÂτT¢ = zF l 146.43 = yF Â°Âτ06 nis)bl 04(= Â°Âτ06 nis F = yF bl 0383.61= xF Â°Âτ53 soc)bl 0.02(= Â°Âτ53 soc hF = xF bl 0.02 = hF Â°Âτ06 soc)bl 04(= Â°Âτ06F)F a(.DC elbac noitcart eht ni)b(,BCA elbac troppus eht ni)a(noisnet eht enimreted NOITULOS ,bl 002 si rolias eht dna riahc sÂτÂTyawstaob eht fo thgiew denibmoc eht taht dna Â°Â°ÂTO 01 = Â2ÂTO (4) dna Â°ÂTO gniwonK .ni 6 = a taht t gniwonk ,eriw hcae ni noisnet eht enimreteD .251 y)z()N 143(.ni 0.15 y :ecroF bl-601 W bl 0.09+ = F .A ta nip eht no rewot eht yb detrexe P ecrof lacitrev eht enimreted ,bl 048 si BA eriw ni noisnet eht fI .R ot ralucidneprep eb lliw P lliw P ecrof tselliw ams ehT .A ta nip eht no rewot eht yb ¤Â£FA = 0, setting P = (2880 N) i and Q = 0, and setting the coefficients of i, j, k equal to 0, give the following three equilibrium equations: i: Â¢Ã¨ 48 T Â¢Ã¨ 12 T Â¢Ã¨ 48 T + 2880 N = 0 (1) 53 AB j: is 12 T 13 AC is 3 T 61 AD + 36 T = 0 (2) 134. 53 AB 13 AC 61 AD k: 19 T = 4 T = 0 (3) 53 AB 13 AC 61 AD 135. 143. SOLUTION PROBLEM 2.41 Determine (a) the voltage required in the AC cable, knowing that the resultant of the three forces exerted at point C of the member BC must be directed along BC, (b) the corresponding magnitude of the resultant. (a) P = (50 N) without 25° P = 21.1 N W (b) R = (50 N) cos 25° R = 45.3 N W 17. Knowing that P must have a 750-N component SOLUTION perpendicular to the ABC member, determine (a) the magnitude of the force P, (b) its component parallel to the ABC. (lb) y Comp. = TBAC = TBAC = TBAC = 62.5 + TBAC = TBAC = TBAC 65 in. (60 in.) i + (25 in.) k = TBAC = TBAC = TBAC 65 in. The voltage in the AB string is 2.2 kN, and the angle is 25Â°. Knowing that P must have a vertical component of 350 pounds, determine (a) the magnitude of the force P, (b) its horizontal component. SOLUTION PROBLEM 2.96 For the Prob plate. SOLUTION PROBLEM 2.99 A container is supported by three cables which are connected to a ceiling as shown.Determine the voltage (a) in the cable Free-Body Diagram Force Triangle Law of sines: TAC sin 110° = TBC sin 5° = 1200 lb sin 65° (a) (b) T = 1200 lb without 110°AC without 65° T = 1200 lb without 5°BC without 65° TAC = 1244 lb W TBC = 115.4 lb W 51. SOLUTION According to the law of sin: TAC = R = 2.2 kN sin30°C sin125°C TAC = 2.603 kN R = 4.264 kN sin 25D (a) TAC = 2.60 kN W (b) R = 4.26 kN W 11. SOLUTION PROBLEM 2.112 A transmission tower is held by three type wires attached to an A-pin and anchored by bolts at B, C and D. SOLUTION Rx = ÂÂ£Fx = (1 00 N) cosine + (150 N) cosine (± + 30°) Â¢Â (200 N) cosine Rx = N) cosãžâ ± + (150 n) cos (± ± + 30ã °) ry = ã Â ¢ £ Â ¢ with '100 100 Â '(150 N) Sin (Î± + 30 Â°) Â' (200 N) SinÂ® Â± RY = Ã '(300 N) SinÂ® Â± Â' (150 N) SinÂ® Â± Â' (150 N) Sin (Ã Â± + 30 Â°) (1) (2) (a) To be vertical, we must have RX = 0. Copyright Â© McGraw-Hill Education. (Suppose the x, y, and z axes are headed east, up, and south, respectively.) Solution Recoil force (A) F = 400 N Â¢'FH = (400 N) Cos40 Â° = 306.42 n fx = Â'fh sin35 Â° = Ã '(306.42 n) sin35 Â° = Ã'175.755 n fy = Â¢'f sin 40-Â° = Â' (400 N) sin 40 Â° = Ã'257 12 n fz = + FH Cos35 Â° = + (306.42 N) Cos35 Â° = +251.00 N FX = Ã'175.8 n w fy = Ã '257 n w fz = + 251n w (b) cosÂ®Â şx = fx = f Â¢'175.755 n 400 n®Â t l = 116.1Â¢ Â w cosâ â Â y = fy = fy = f Â¢'257.12 n 400 n Ã®Â ki = 130.0 Â° w cosÂ®Â ki = fz = f 251.00 n 400 n Ã®Â ki = 51.1 Â° W 76. Problem 2.131 Two cables are tied together with C and loaded as shown. Problem 2.105 (continued) Replace the expressions obtained for tabs, TAC and TAD and Factoring I, J and K: (Ã.48TAB + 0.51948TAD) I + (0.8Tab + 0.88235TAC + 0.77922TAD Â¢'w) j + (Â¢'0.36tab + 0.47059tac Â¢ '0.35059TAD Â' 0.35065TAD) K = 0 Egactive at zero the coefficients of I, J, K: Ã'0.48TAB + 0.51948TAD = 0.8Tab + 0.88235TAC + 0.77922 Tad Â¢'w = 0 Â¢'0.36TAB + 0.47059TAC Ã '0.35065TAD = 0 (1) (2) (3) TAC replacement = 544 lb in equations (1), (2), and (3) above, and solve the resulting set of equations using conventional algorithms, dÃ : Tab = 374.27 lb tad = 345.82 lb w = 1049 lb w 115. Know that the spring voltage Ã¨ of 50 lb, determine (a) the x, y, and z force components exerted on the circular plate at B, (b) the angles Ã®Â F1, Ã®B F1 and Ã®B Z which define the direction of the force at B. Solve the forces in X and Y directions : R = P + Q + FA + FB = 0 Free-body Body Diagram Substitution Components: r = Ã '(500 lb) J + [(650 lb) Cos50 Â°] I Â¢' [(650 lb) Sin50] j + fbi Â¢''(fa Cos50 Â°) I + (FA SIN 50 Â°) J = 0 in the Y direction (an unknown force): Â'500 lb Ã '(650 lb) SIN50 Â° + FA SIN50-Â° = 0 LB + (650 lb) sin50 "then, fa = sin50 Â ° in the X: X direction: = 1302.70 lb (650 lb) cos50 Â° + fb Â¢ 'fa cos50 Â° = 0 fb = fa cos50 Â° Â¢' (650 lb) cos50 Â° = (1302.70 lb) cos50 Â° Â¢' (650 lb) cos50 Â° = 419.55 lb fa = 1303 lb w fb = 422 lb w 54. Vector mechanics for engineers: static and dynamic Ã¨ was written and Ã¨ associated with the ISBN: 9780073398242. Under the tube holder T ABC. Chapter 2 Ã ~ Ã Ã Ã Ã© McGraw-Hill Education. (a) FX = (120 lb) COS 60 Â° COS 20 Â° FX = 56,382 lb fy = Â¢ '(120 lb) sin 60 Â° fy = Â¢'103,923 lb fz = Â' (120 lb) COS 60 Â° sin 20 Â° fz = Ã '20,521 lb fx = +56.4 lb w fy =¢'103.9 lb w fz = Â¢'20.5 lb w (b) so what Ã®Â merely x = Ã®Â ¬ ach y = Ã®Â explicitly = Fx = f fy = f fz = f 56.382 lb 120 lb Â¢'103.923 lb 120 lb Â¢'20.52 lb 120 lb ÃÂ explicitly = 62.0 Â° W Î³y = 150.0 Â° W Î³ ●= 99.8 Â° W 161. Know that the resultant of the two forces applied to A Ã¨ directed along the car axis, determine by trigonometry (a) the voltage in the AC cord, (b) the entity the resultant of the two forces applied to A . Solution cos2 Ã®Â÷ + cos2 Ã®Â÷ + cos2 Ã®Â ² = 1 x y z Cos2 (69.3 Â°) + cos2 Ã®Â₂ (a) since the fy

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