

ARCH 331. Assignment #2

Date: 1/23/18, due 2/1/18

Pass-fail work

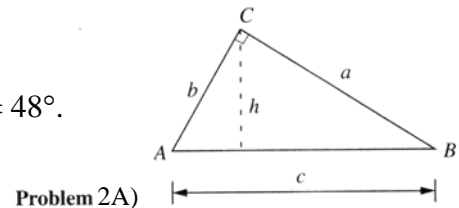
Problems: supplemental problems (2A, etc.) **and** from Onouye & Kane, Chapters 2, 3 & 4

*Notes: Problems marked with a * have been altered with respect to the problem stated in the text.*

The "Find, Given, Solution" format is required unless noted.

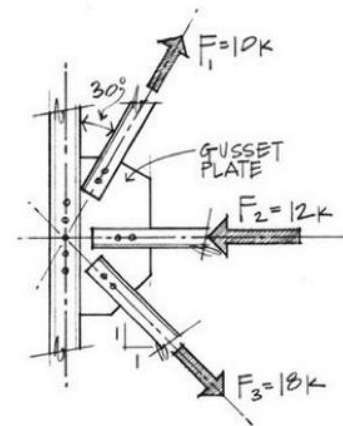
- (5%) 2A) In the right triangle ABC shown, $c = 25$ ft and angle $A = 48^\circ$. Determine a) side a , b) side b , and c) height h . (*math*)

Partial answer to check with: $h = 12.43$ ft



- (12%) 2.9 Three members of a truss frame into a steel gusset plate as shown. All forces are concurrent at point O. Determine the resultant of the three forces that must be carried by the gusset plate. (*force component method*)

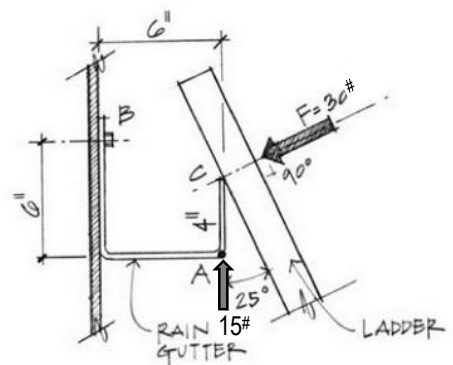
Partial answers to check with: $R = 7.03$ k,
 $\theta = -35.4^\circ$ (below +x)



- (13%) *2.21 A rain gutter is subjected to a 30# force at C as shown. Determine the moment developed about A and B. There is also a vertical force of 15 lb at A.

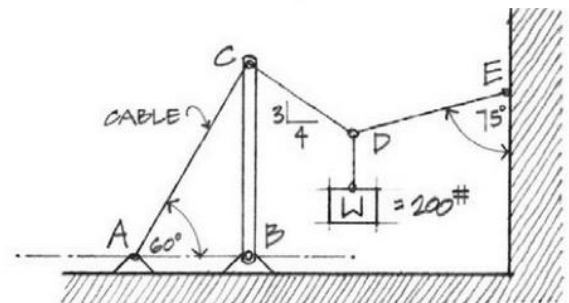
(moment of a force and of force component)

Partial answers to check with: $M_A = +108.8$ lb-in
 $M_B = -40.5$ lb-in



- (26%) 2.33 A weight $W = 200\#$ is supported by a cable system as shown. Determine all cable forces and the force in the vertical boom BC. (*equilibrium of a particle*)

Partial answers to check with: $DE = 203$ lb,
 $DC = 246$ lb, $AC = 393$ lb, $BC = 488$ lb (C)

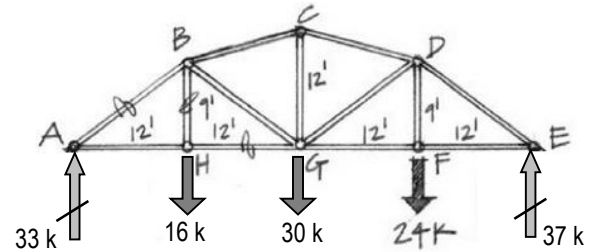


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all member forces

- (35%) * 3.21 Solve for AB , BH , and HG . Use only one section cut using the method of joints, and knowing there is a vertical support force of 33 k up at A, and 37 k up at E with additional loads of 16 k at H and 30 k at G as shown (method of joints)

Partial answers to check with: $AB = -55$ k,
 $BH = 16$ k, $BG = 7.5$ k, $GF = 49.33$ k,
 $CD = -51.54$ k, $GD = 0.83$ k, $DE = -61.67$ k.



- (9%) 2B) For the truss of problem *3.21, use Multiframe software to find all member forces to verify your work from method of joints. You will be assigned a standard wide-flange (W) steel section to use posted in My Grades on eCampus. Model the force at A using a pin support (triangle) and the force at E using a roller support (triangle with wheels) as shown in the figure. Submit the data file (.mfd) on eCampus (under Assignments: Assignment 2) and provide a print of the axial forces diagram (P).

Note: The "Find, Given, Solution" format is not required, but the data file submitted to e-Campus and the print-out attached to the submission are.

