PRINT NAME and NET ID_____

Signature_____

GEN_ENG_205-2

Engineering Analysis II

Midterm 2: 12 - 12.50pm

Tuesday February 25, 2020

A. Alarcón

Instructions.

- Closed book and notes.
- Turn off all electronic devices and put away all items except a pen/pencil, eraser and a calculator.
- Remove hats and sunglasses
- **Show sufficient work to justify your answer.** Messy work will not be graded.
- While the test is in progress we will not answer questions concerning the test material.
- Do not leave early unless you are at the end of a row.
- Quit working and close the test when we say STOP.
- Quickly turn in your test to me or a TA. If a test leaves the room it will not be graded.
- You can use the right pages for calculations. If you need more paper, we will provide some more. There are 4 problems and 2 bonus questions.
- Bonus1: What temperature scale does Prof. Alarcon use this quarter? (1 point):
- Bonus 2: How many times I have used the word equilibrium this quarter? (1 point)

Problem	Points	
1	20	
2	20	
3	27	
4	10	
Bonus	2	
Total	77	

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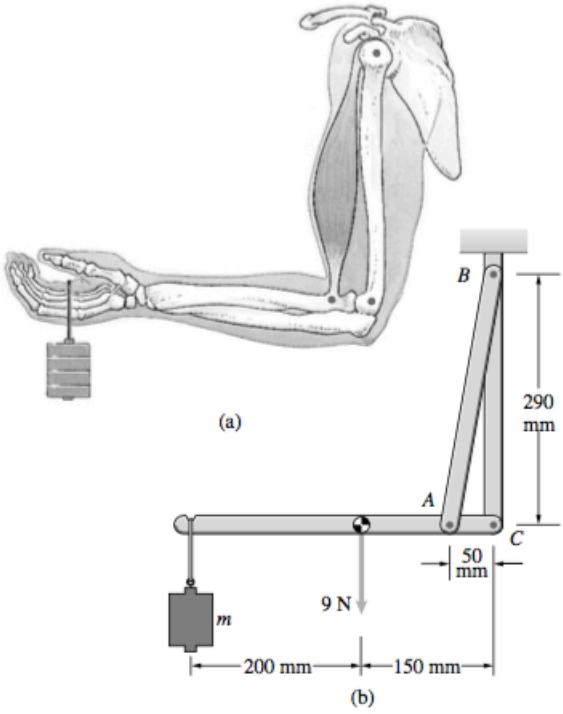
Problem 1 (20 points)

Figure (a) is a diagram of the bones and biceps muscle of a person's arm supporting a mass. Tension in the biceps muscle holds the forearm in the horizontal position, as illustrated in the simple mechanical model in Figure (b). The weight of the forearm is $9N$, and the mass $m = 2\ kg$.



(a) Determine the tension in the biceps muscle *AB*.

(b) Draw the forces on the horizontal element (forearm) with the correct orientation.

(c) Determine the magnitude of the resultant force exerted on the upper arm by the forearm at the elbow joint *C*.

$T_{AB} =$

$F_C =$

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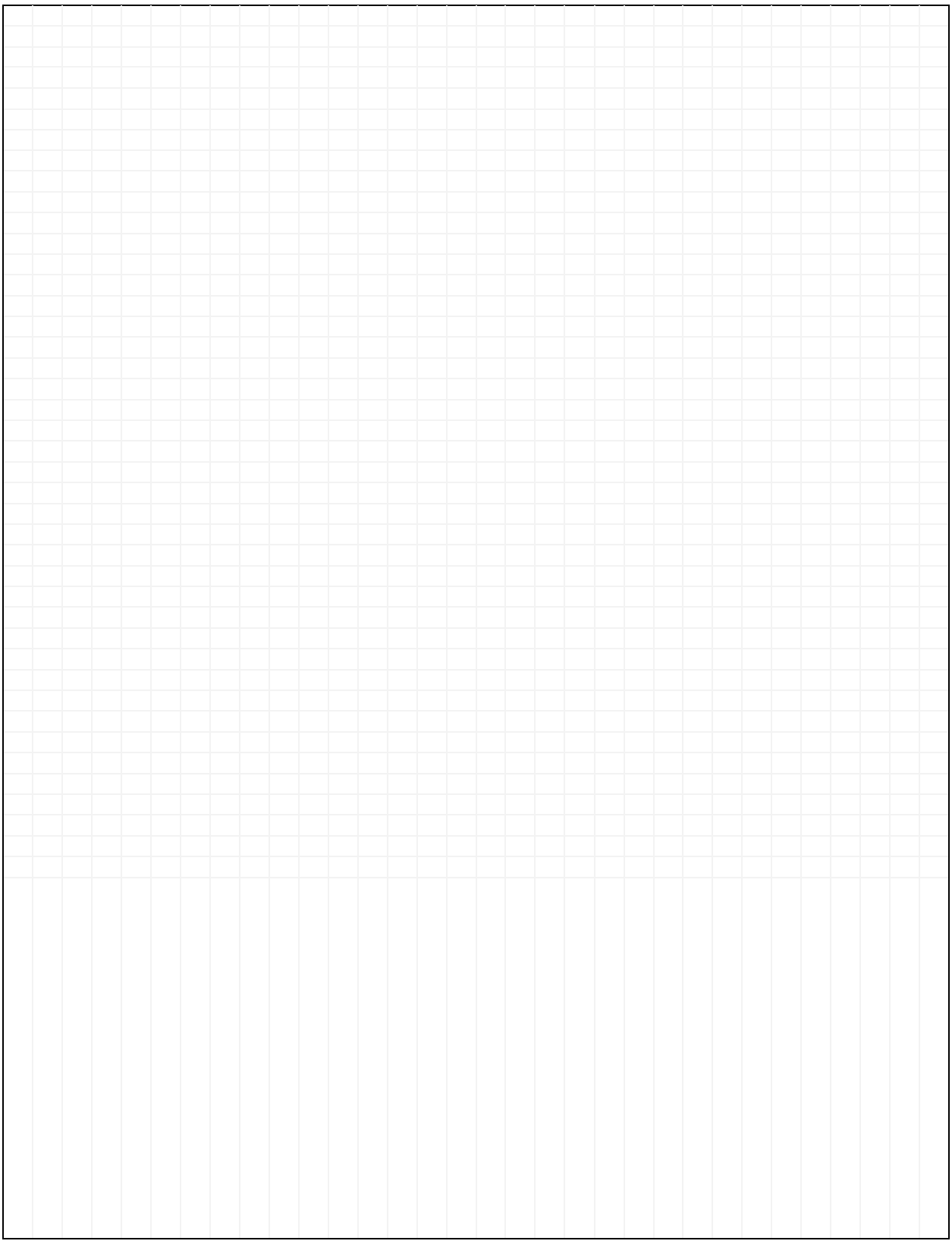
Additional Work Area:



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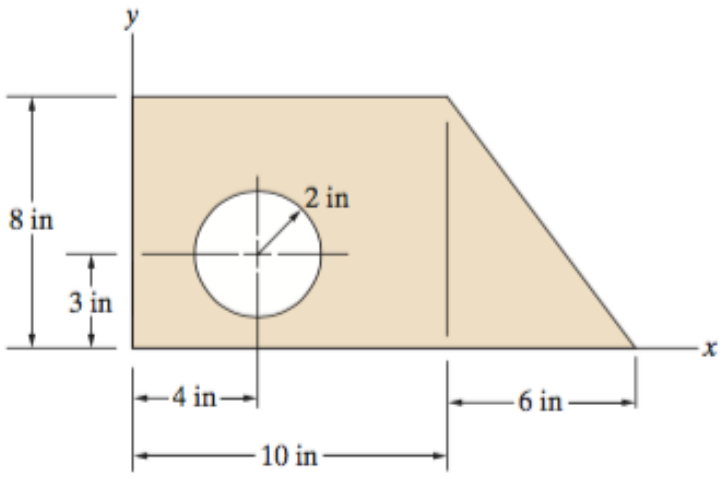
Problem 2 (20 points)

Determine the coordinates of the centroid of the composite area. Clearly indicate all steps.



Coordinates: x= y=

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Additional Work Area:

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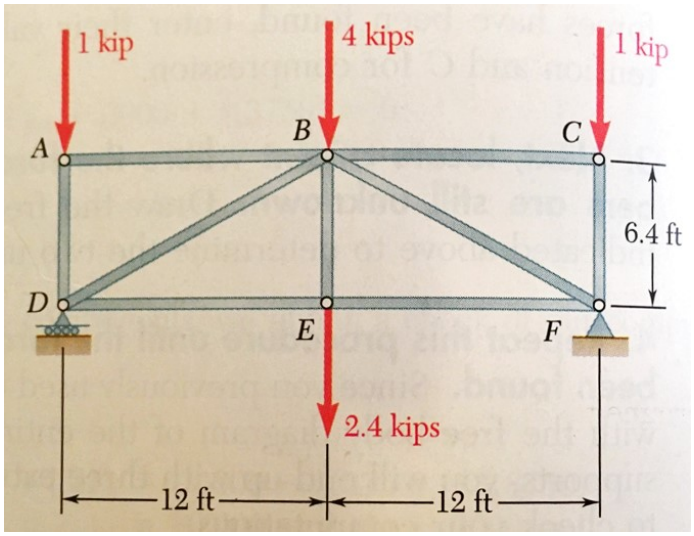
Problem 3 (27 points)



Determine forces on all the members in the figure. Fill in the table below to indicate magnitudes of forces and whether member is in tension or compression.

Check your work carefully; credit will be based on your entries on the table.

Member	Magnitude (kip)	Tension/Compression
AB		
BC		
AD		
BD		
BE		
BF		
CF		
DE		
EF		

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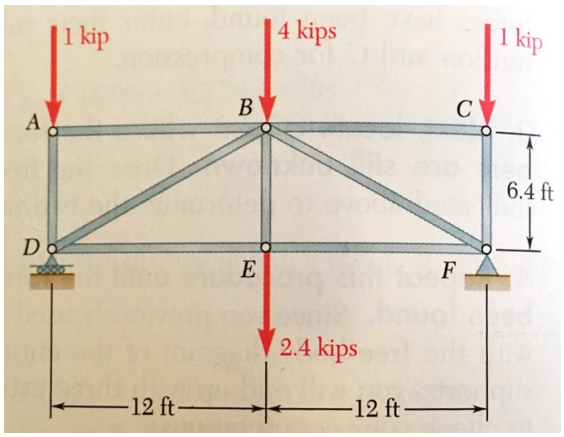

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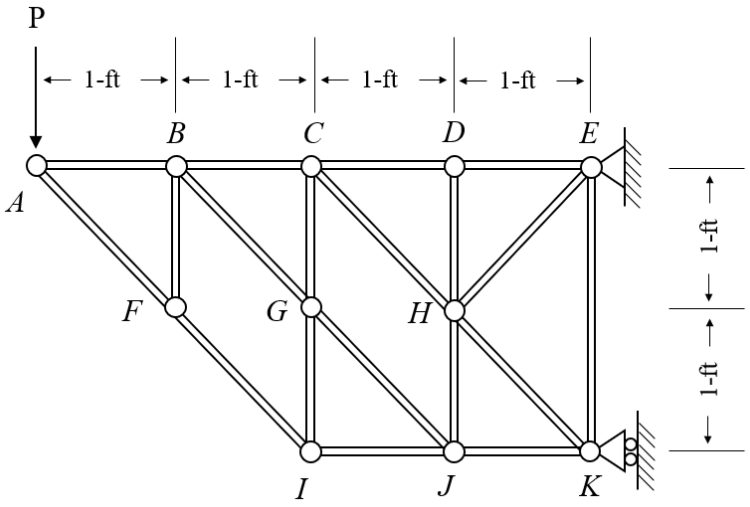
Problem 4 (10 points)

Find all the zero-force members in the figure. Check after the member name on the table below if it is zero-force member.

Credit will be based on the table below.



AB	[ ]	*BC*	[ ]	*CD*	[ ]	*DE*	[ ]	*AF*	[ ]	*BF*	[ ]	*BG*	[ ]						
CG	[ ]	*CH*	[ ]	*DH*	[ ]	*EH*	[ ]	*FI*	[ ]	*GI*	[ ]								
GJ	[ ]	*HJ*	[ ]	*HK*	[ ]	*EK*	[ ]	*IJ*	[ ]	*JK*	[ ]								