

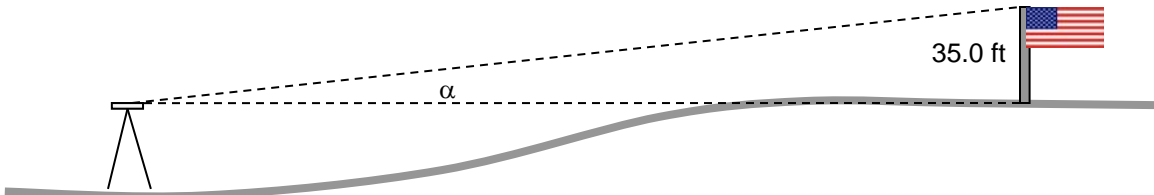
CIVL 1101

Fall 2024

REVIEW FOR FINAL EXAM

Multiple Choice Questions – 2 points each

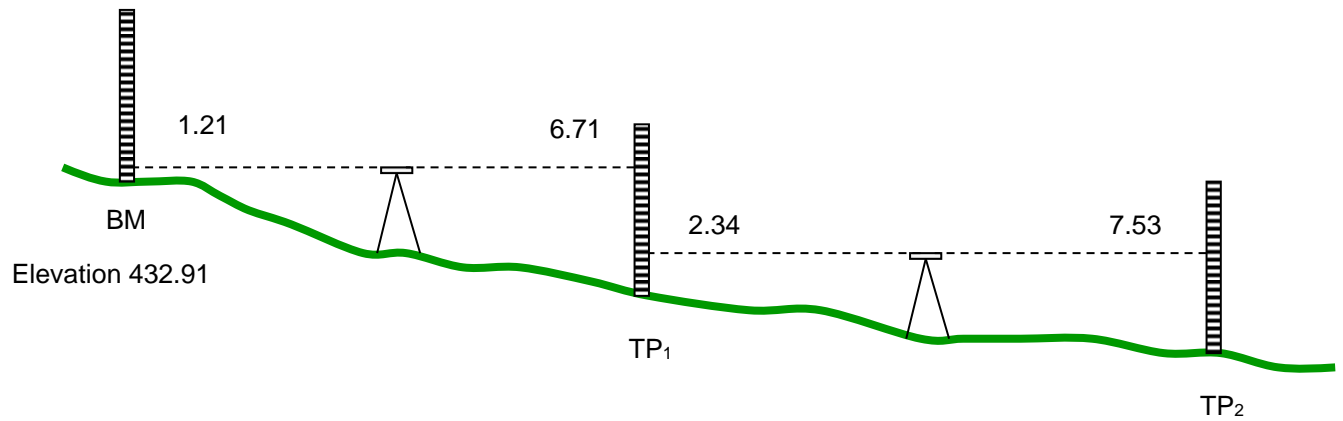
1. A random error of ± 0.11 ft is estimated for each of 12 length measurements that are added together to get the total length. What is the estimated total error for the total length?
 - A. ± 0.38 ft
 - B. ± 0.33 ft
 - C. ± 0.28 ft
 - D. ± 0.19 ft
 - E. ± 0.01 ft
2. What is the distance to the flag pole if the pole is 35.0 ft in height and the measured angle $\alpha = 7^\circ 45' 30''$.



- A. 4.87 ft
- B. 35.0 ft
- C. 100 ft
- D. 257 ft
- E. 295 ft

Point	BS	HI	FS	Elevation
BM ₁	1.23			100.00
TP ₁	2.25		4.52	
TP ₂	6.25		4.65	
TP ₃	4.23		3.21	
TP ₄	1.47		5.69	
BM ₂			8.42	
		Change in elevation		

3. Complete and check the above set of level notes and estimate the height of the instrument between points TP₂ and TP₃.
 - A. 102.42 ft
 - B. 101.58 ft
 - C. 100.56 ft
 - D. 97.36 ft
 - E. 95.48 ft
4. Complete and check the above set of level notes and estimate the elevation of point BM₂.
 - A. 101.02 ft
 - B. 100.02 ft
 - C. 98.02 ft
 - D. 97.35 ft
 - E. 88.94 ft

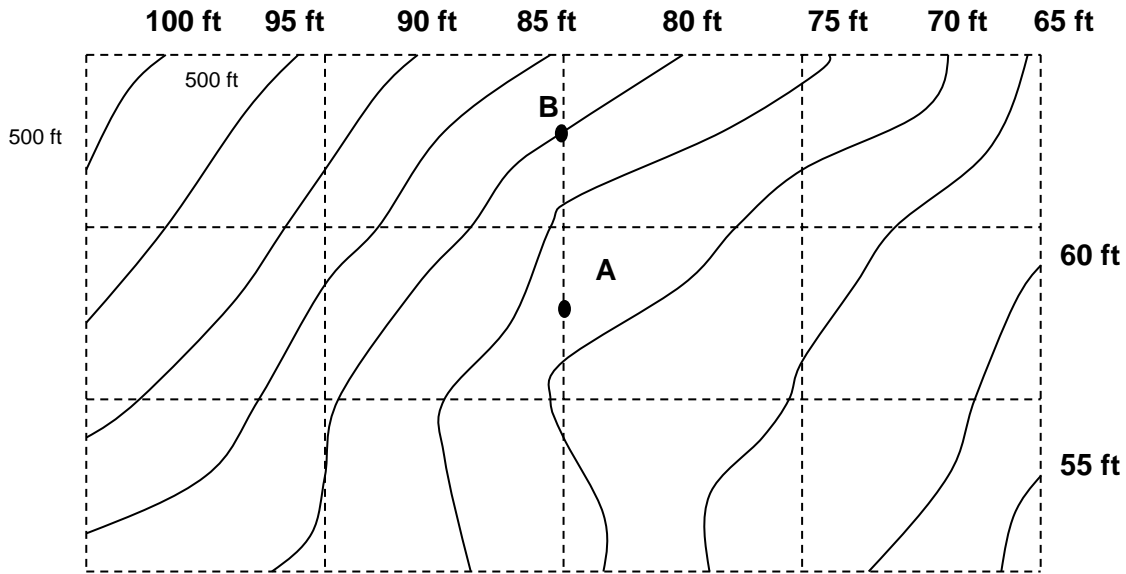


Point	BS	HI	FS	Elevation
BM ₁				
TP ₁				
TP ₂				
		Change in elevation		

5. Develop and check a set of level notes from the above figure. What is the FS at point TP₂?
 - A. 1.34 ft
 - B. 3.20 ft
 - C. 4.41 ft
 - D. 6.71 ft
 - E. 7.53 ft

6. What is the change in elevation between points BM₁ and TP₂?
 - A. -16.40 ft
 - B. -10.69 ft
 - C. 4.54 ft
 - D. 10.94 ft
 - E. 432.91 ft

From the topographic data given in the figure below, answer the following four questions.



7. Estimate the elevation of Point A?

- A. 65 ft
- B. 68 ft
- C. 70 ft
- D. 73 ft
- E. 75 ft

8. Which of the following values is most nearly slope between Point A and Point B?

- A. 1%
- B. 3%
- C. 5%
- D. 7%
- E. 9%

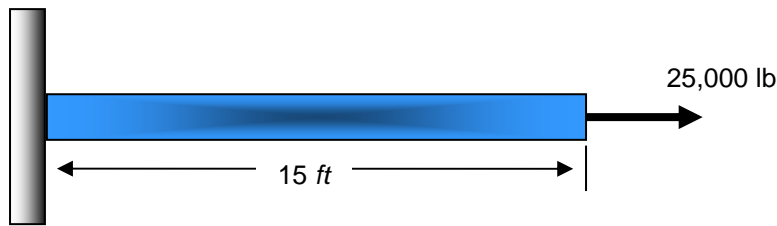
9. For the following site data, what would be an appropriate square grid spacing to develop a contour map using one-foot intervals?

- A. 5 foot
- B. 10 foot
- C. 15 foot
- D. 20 foot
- E. 25 foot

Side	Distance
AB	100.0
BC	150.0
CD	200.0
DA	100.0

Point	Elevation
A	100.0
B	105.0
C	108.0
D	105.0

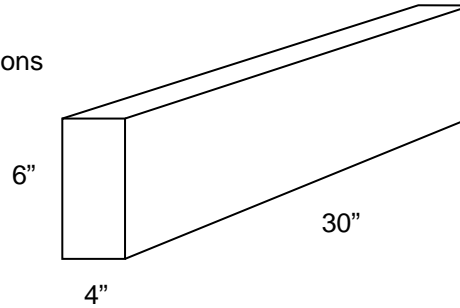
Consider the linear-elastic prismatic bar fixed on the left-hand-side and loaded by an axial force at the right-hand-side, as shown in figure below.



10. If the bar fails at strains greater than 0.05, what is the largest allowable deformation of bar to prevent failure?
- A. 11 inches
 - B. 9 inches
 - C. 7 inches
 - D. 5 inches
 - E. 2 inches
11. If the bar yields at a deformation of 0.25 inches under an axial load, estimate the yield stress in the material if the modulus of elasticity of 29,000 ksi?
- A. 20 ksi
 - B. 40 ksi
 - C. 60 ksi
 - D. 80 ksi
 - E. 100 ksi
12. What is the deformation of the bar shown above if its cross-sectional area is 0.5 in^2 and the modulus of elasticity of the material is 29,000 ksi?
- A. 0.03 inches
 - B. 0.31 inches
 - C. 0.62 inches
 - D. 1.25 inches
 - E. 2.50 inches

Construct **ten** beams, each having the dimensions shown in the figure below. Include a "make-sure-you-have-enough" factor of 1.2 in your mix calculations. Assume a w/c ratio of 0.35 and a mix design of 1:2:3. All weights should be reported to the nearest quarter-pound. Assume concrete weights 145 lb/ft³.

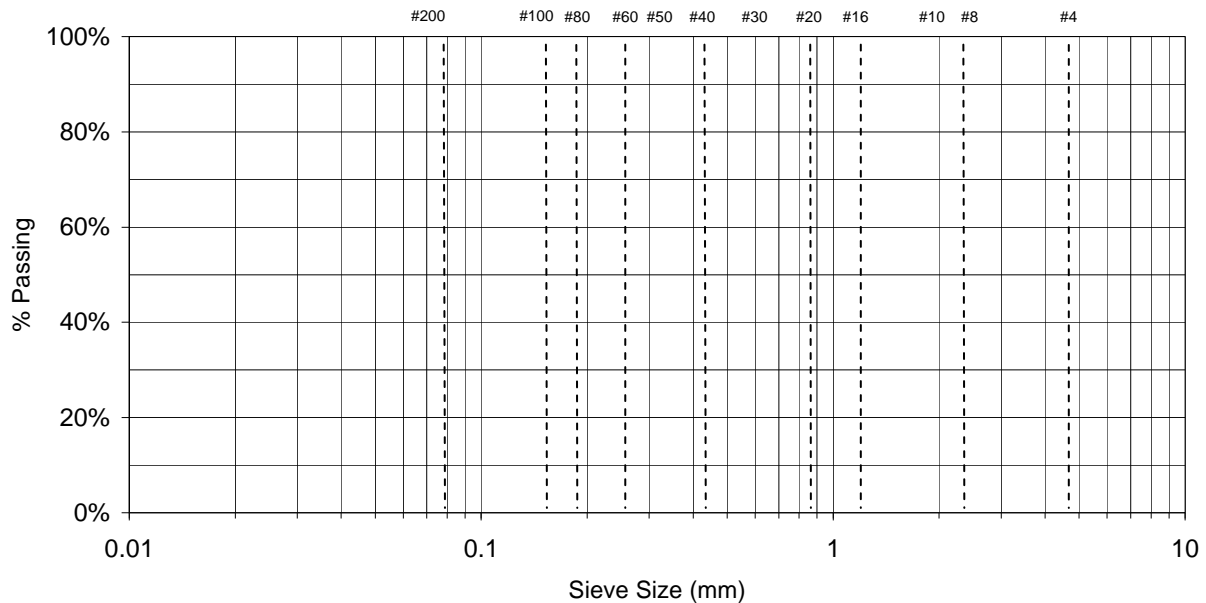
Beam dimensions



13. The total volume of concrete required for this application is estimated to be:
- A. 1,080 in³
 - B. 2,700 in³
 - C. 7,200 in³
 - D. 8,640 in³
 - E. 9,640 in³
14. The weight of cement required to make 600 lbs of the concrete mix describe above is:
- A. 40 lbs
 - B. 60 lbs
 - C. 80 lbs
 - D. 100 lbs
 - E. 120 lbs
15. The weight of course aggregate required to make 300 lbs of the concrete mix describe above is:
- A. 75 lbs
 - B. 100 lbs
 - C. 125 lbs
 - D. 150 lbs
 - E. 175 lbs

From the data given below, develop a particle-size distribution plot. Use the table and blank graph shown below:

Sieve Number	Diameter (mm)	Mass of Soil Retained on Each Sieve (g)	Percent Retained (%)	Cumulative % Retained	Percent Finer (%)
4	4.750	0.0			
8	2.360	40.0			
16	1.180	100.0			
30	0.600	100.0			
50	0.300	100.0			
100	0.150	60.0			
PAN	---	0.0			



Use the above sieve analysis to answer the following three questions.

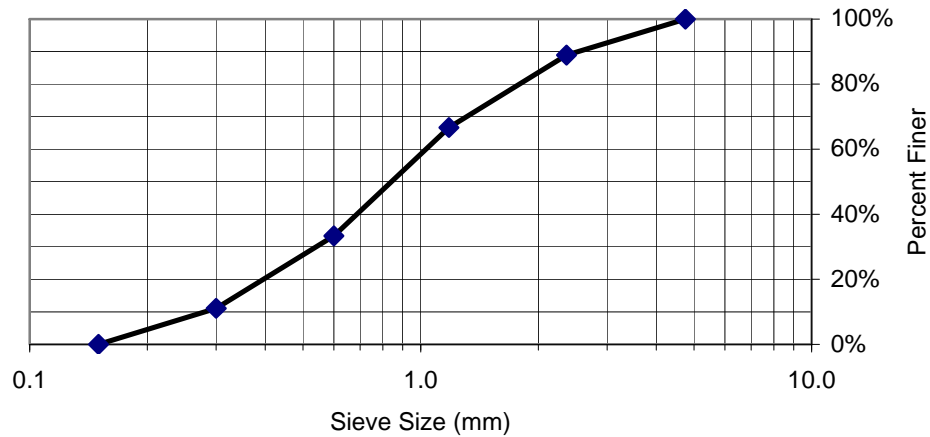
16. The percent passing the #30 sieve may be most closely approximated as:

- A. 100%
- B. 80%
- C. 40%
- D. 20%
- E. 10%

17. The effective size of the soil may be most closely approximated as:

- A. 0.01 mm
- B. 0.10 mm
- C. 0.20 mm
- D. 0.25 mm
- E. 0.40 mm

Consider the particle-size distribution plot shown below.



18. The effective size of the soil shown in the graph above is most closely approximated by:
 - A. 0.3 mm
 - B. 0.4 mm
 - C. 0.5 mm
 - D. 0.6 mm
 - E. 0.7 mm
19. The particle-size D_{30} is most closely approximated as:
 - A. 0.55 mm
 - B. 0.65 mm
 - C. 0.75 mm
 - D. 0.85 mm
 - E. 1.05 mm
20. Which of the following filtration mechanisms is **not** involved in removing suspended solids in a granular-media filter?
 - A. interception
 - B. straining
 - C. flocculation
 - D. hydration
 - E. sedimentation
21. The hydraulic loading rate in the 3.5 inch diameter filters in lab, with a flowrate of 1,250 ml/min, is most nearly approximated as:
 - A. 1.0 gpm/ft²
 - B. 2.0 gpm/ft²
 - C. 3.0 gpm/ft²
 - D. 4.0 gpm/ft²
 - E. 5.0 gpm/ft²
22. The backwash velocity required to expand a sand bed filter to a porosity of 0.70 for a sand with a settling velocity is 0.20 ft/s and the initial porosity of the sand is 0.35 is most nearly approximated as:
 - A. 0.01 ft/s
 - B. 0.03 ft/s
 - C. 0.04 ft/s
 - D. 0.05 ft/s
 - E. 0.07 ft/s

Initial NTU

100

time (min)	Flowrate (ml/min)	Turbidity (NTU)	V (ml)	Average Turbidity (NTU)
0	1000	2	---	---
10	1000	2		
20	900	3		
30	900	5		
40	800	6		
50	800	8		
60	---	10		

Sum

23. The results of a filter run, operated in a manner identical to that used in lab, are shown in the table above. Which of the following volumes most closely estimates the total volume treated after 60 minutes?
- 24,000 ml
 - 36,000 ml
 - 48,000 ml
 - 54,000 ml
 - 72,000 ml
24. Which of the following values most closely estimates the average turbidity after 60 minutes?
- 0 NTU
 - 3 NTU
 - 5 NTU
 - 7 NTU
 - 9 NTU
25. If the average turbidity is 10 NTU at the end of 60 minutes, which of the following values most closely estimates the %NTU removed?
- 100%
 - 95%
 - 90%
 - 85%
 - 80%

Equation Sheet

$$V = V_s \alpha_e^{4.5} \quad L_e = \frac{L(1-\alpha)}{1 - \left(\frac{V}{V_s} \right)^{0.22}}$$

7.48 gallons = 1 ft³
3.785 liters = 1 gallon