

Name

Signature

Problem	Total Points	Score
1	15	
2	10	
3	15	
4	10	
5	30	
6	15	
7	10	
Total	105	

- You are not permitted to use a calculator on this exam.
- In order to receive full credit, you must show your work. Be wary of doing computations in your head. Instead, write out your computations on the exam paper.
- If you need more room, use the backs of the pages and indicate to the grader that you have done so.
- Raise your hand if you have a question.
- Good luck!

1 (15 points)

(a) (5 points) Circle the correct one:

Reference angle of an angle is always an **acute** / **obtuse** / **straight** / **quadrantal** angle.

(b) (10 points) A surveyor measured the angle of elevation to be  $60^\circ$ . The transit is 3 feet above the ground (that is the distance between B and D in the graph) and 100 feet from the tower. Find the height of the tower.

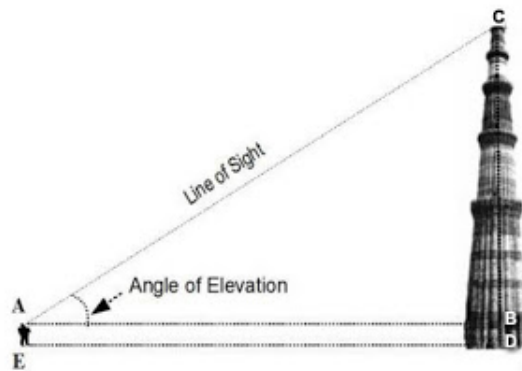


Fig 6

2 (10 points)

(a) (5 points) Find the value of  $\cos^2(15^\circ) + \cos^2(75^\circ) - 3$ .

(b) (5 points) Find the value of  $\cos(30^\circ) + \sin(\frac{\pi}{6}) + \tan(\frac{\pi}{4})$ .

3 (15 points)

(a) (5 points) Convert  $-\frac{3\pi}{4}$  to degrees.

(b) (5 points) Find a positive angle less than  $360^\circ$  that is coterminal with  $-135^\circ$ .

(c) (5 points) Find the reference angle of  $-135^\circ$ .

4 (10 points) A circle has a radius 6 feet. Find the length of the arc intercepted by a central angle of  $240^\circ$ .

5 (30 points)

(a) (10 points) If  $\cos(\theta) = \frac{\sqrt{6}}{3}$ , and  $\theta$  is an acute angle, then find  $\csc(\theta)$ .

(b) (10 points) Find exact value of  $\csc(35^\circ) \sin(35^\circ) + \sec(15^\circ) \cos(15^\circ)$ .

(c) (10 points) Find the exact value of

$$\sin 15^\circ \cos 75^\circ + \frac{\cos 15^\circ}{\sec 15^\circ}$$

6 (15 points)

- (a) (10 points) If the point  $(6, -8)$  is on the terminal side of an angle  $\theta$ , then find the exact values of  $\cot(\theta)$  and  $\csc(\theta)$ .

- (b) (5 points) Evaluate  $\sin(270^\circ)$ . Show your work.

7 (10 points) If  $\sec(\theta) = -3$ , and  $\tan(\theta) > 0$ , then find the exact values of  $\sin \theta$ .