

Exam #1 · Wednesday September 27, 2006

MATH 111 · Section 7 · Fall 2006

Name _____

Problem 1. (This is a writing problem. Please use complete sentences.) Is it possible for $\sin \theta$, $\cos \theta$, and $\tan \theta$ to all be negative for the same value of θ ? Explain.

Problem 2. Solve for x : $\sin(3x + 2^\circ) = \cos(8x)$. (Hint: use a cofunction identity.)

Problem 3. Consider the following figure:

Part (a) What trigonometric function of θ does m/z represent?

Part (b) What trigonometric function of θ does z/a represent?

Problem 4. Let $\theta = -135^\circ$.

Part (a) Sketch θ in standard position.

Part (b) Find a positive and a negative angle (different from θ) which is coterminal with θ .

Part (c) Write an algebraic expression for all angles which are coterminal with θ .

Part (d) Find $\cos(\theta)$ exactly.

Problem 5. True or false:

Part (a) It is possible for $\sin(\theta) = \sqrt{6}$ for some angle θ .

Part (b) It is possible for $\sec(\theta) = 0.8$ for some angle θ .

Part (c) It is possible for $\tan(\theta) = 98.23$ for some angle θ .

Problem 6. The blueprint for a radio transmitter shows a tower 19.8 in tall with a cable running from the top of the tower to a point a point on the ground 11.1 in to the left. You approach the tower itself (not the blueprint) and measure the distance from the base of the cable to the base of the tower to be 347.9 ft.

Part (a) How tall is the tower?

Part (b) How long is the cable (assuming, for the sake of Math 111, that it does not sag under its own weight)?

Problem 7. If a point (a, b) is in quadrant III, what quadrant is $(-a, b)$ in?

Problem 8. Find the measures of the angles α and β and the measures of the sides m , n , p , and q .

Problem 9. Which of the following is true for all angles θ ?

- (A) If $\sin(\theta) < 0$ then $\tan(\theta) < 0$.
- (B) If $\tan(\theta) = 1/2$ then $\sin(\theta) = 1$ and $\cos(\theta) = 2$.
- (C) $\sin(\theta) \neq \cos(\theta)$.
- (D) If $\sin(\theta) < 0$ then $\csc(\theta) < 0$.
- (E) None of these

Problem 10. An aircraft is flying over level ground. (The direction of flight is out of the page in the figure.) The plane's altimeter shows an altitude of 2438 meters. The pilot sees a target out the right window, and measures that the target lies at an angle of 67.29° from the vertical.

Part (a) In the previous paragraph, two numbers are mentioned. Write them where they belong in the figure.

Part (b) What is the distance from the aircraft to the target?

Problem 11. In the figure, how many times does the large gear rotate counterclockwise for each time the smaller gear rotates one full revolution clockwise?