

Oregon Institute of Technology Dual Credit Program

Math 112, Spring 2020

Exam 2

Name: _____

Show any relevant work. For each problem, circle your final answer

1. (15 points) For each value of t given below, find the reference number t' and the coordinates of the terminal point determined by t . Include a reference angle sketch.

a. $t = \frac{5\pi}{3}$

b. $t = -\frac{3\pi}{4}$

2. (15 points) Find the exact value of each of the following. Include a reference angle sketch.

a. $\csc\left(-\frac{\pi}{3}\right)$

b. $\tan\left(\frac{13\pi}{6}\right)$

3. (16 points) Suppose $\cos x = -\frac{12}{13}$ and $\sin x > 0$. Find the following: (Include a reference triangle)

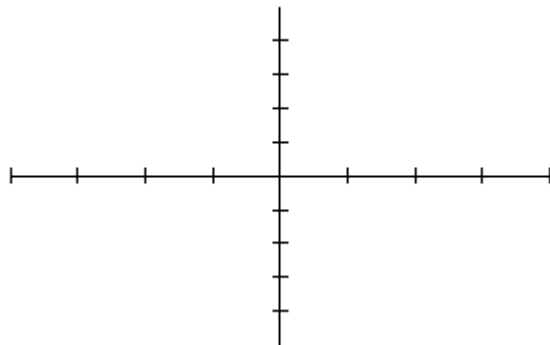
a. $\cos(-x)$

b. $\sin(x)$

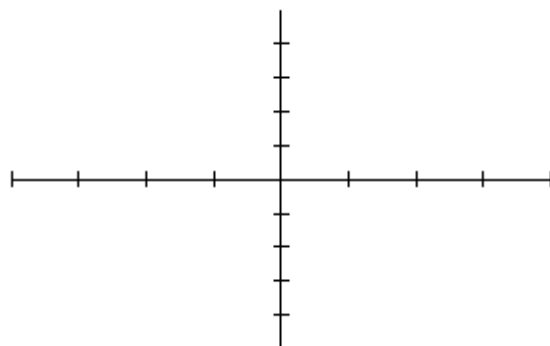
4. (6 points) For what values of x is $\cos^{-1}(\cos x) = x$?

5. (16 points) For each of the following functions, sketch one period of the graph carefully. Label the grid sufficiently to indicate the period, amplitude and asymptotes.

a. $f(x) = 3\sin \frac{\pi}{2}(x - 1)$



b. $f(x) = 4\tan (2x)$



6. (16 points) Find the exact values of each of the following. Include a reference angle sketch.

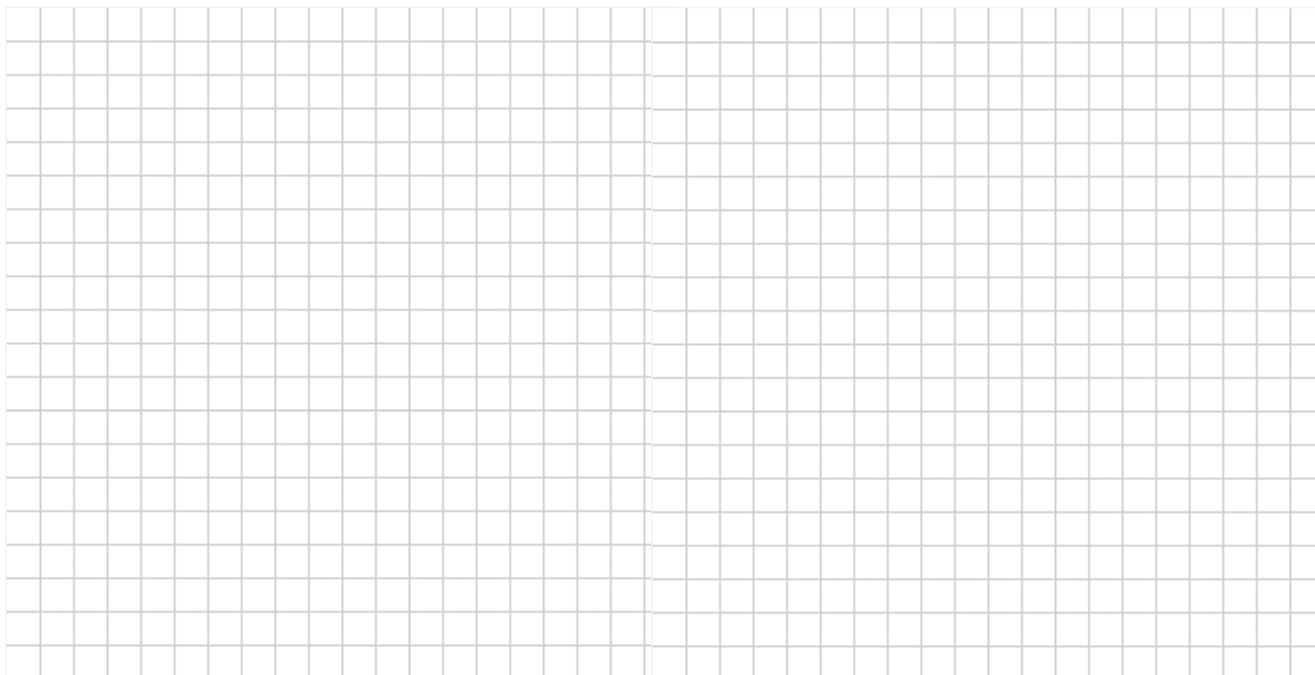
a. $\cos^{-1}(\frac{1}{2})$

b. $\sin^{-1}(\cos (\frac{4\pi}{3}))$

c. $\tan^{-1}(\tan(\frac{5\pi}{6}))$

7. (16 points) A toy boat sits on the surface of lake Scappoose. On a calm day the boat would sit $10m$ above the lake bottom. Today, a stiff breeze is blowing causing the boat to rise and fall regularly with the waves. The total difference in the height from the top of a wave to the bottom is $4m$. The boat bobs up and down 15 times every minute. Assume the boat begins at the calm lake level.

a) Sketch a graph that models the position of the boat in reference to the lake bottom. Only one period of the function is necessary.



b) Find an equation for this model.

c) What is the maximum displacement between the boat and the lake bottom.