Math 1060 Online Mid-Term #1 Name Key

Instructor: _____

PART 1 - NO CALCULATOR

This part of the test should be completed without use of a calculator. When this part is complete, turn it in to get Part 2.

Read directions caretully so that you answer what is asked. Please show all appropriate work on the test. It is NOT necessary to rationalize denominators. All answers should be in exact simplified form. Leave answers in terms of π if appropriate.

Find the measures of two angles, one positive and one negative, that are coterminal with the given angle.

1) $\frac{6\pi}{5}$

$\frac{6\pi}{5} + \frac{10\pi}{5} = \boxed{\frac{16\pi}{5}}$

$\frac{6\pi}{5} - \frac{10\pi}{5} = \boxed{\frac{-4\pi}{5}}$

Convert the radian measure to degree measure.

2) $\frac{\pi}{5}$

$\frac{\pi}{5} \cdot \frac{360^\circ}{2\pi} = \frac{360^\circ}{10} = \boxed{36^\circ}$

Find the exact value of the following expressions. If it is undefined, state so.

3) $\sin\left(\frac{5\pi}{4}\right)$

$= -\frac{\sqrt{2}}{2}$

4) $\tan 120^\circ$

$= -\sqrt{3}$

5) $\cot\left(\frac{7\pi}{4}\right)$ = -1

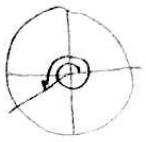
6) $\csc(\pi)$

undefined

$\frac{1}{\sin(\pi)} = \frac{1}{0}$

7) tan 570°

$570° - 360 = 210$

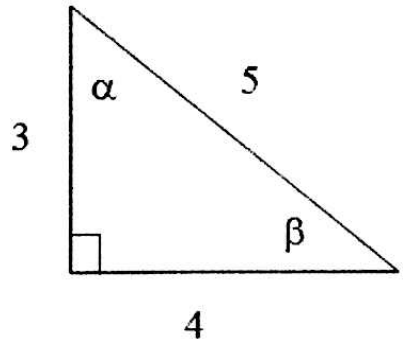


$\tan(210) = \frac{-1/2}{-\sqrt{3}/2} = \boxed{\frac{1}{\sqrt{3}} \text{ or } \frac{\sqrt{3}}{3}}$

For the triangle shown below, find the following:

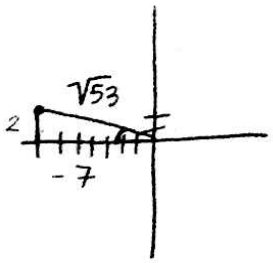
8) a) $\tan\beta = \frac{opp}{adj} = \boxed{\frac{3}{4}}$

b) $\sec\alpha = \frac{1}{\cos\alpha} = \frac{hyp}{adj} = \boxed{\frac{5}{3}}$



Given that α is an angle in standard position whose terminal side contains (–7, 2), find the following:

9) a) $\sin\alpha$ = $\frac{2}{\sqrt{53}}$ or $\frac{2\sqrt{53}}{53}$



b) $\sec\alpha$ = $\frac{hyp}{adj}$ = $-\frac{\sqrt{53}}{7}$

$2^2 + (7)^2 = c^2$

$4 + 49$

$53 = c^2$

Find what is asked and then graph the function over two complete periods.

10) $y = -3\cos\left(x + \frac{\pi}{2}\right) - 1$

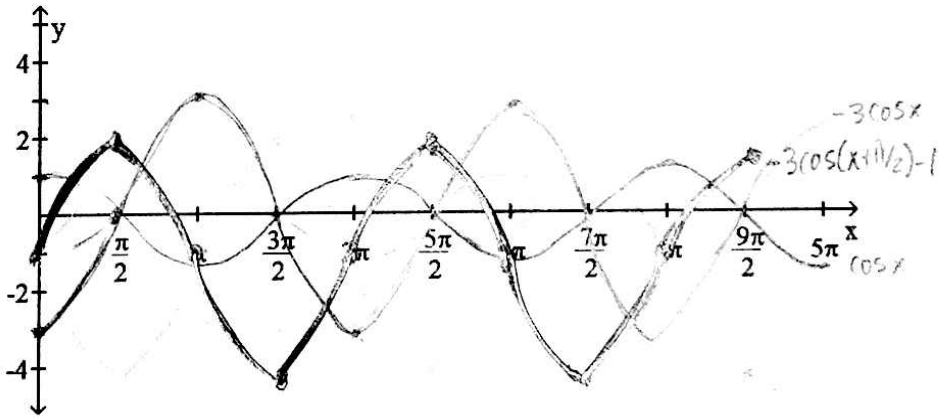
↑ reflect

a) amplitude: |3|

b) period: 2π

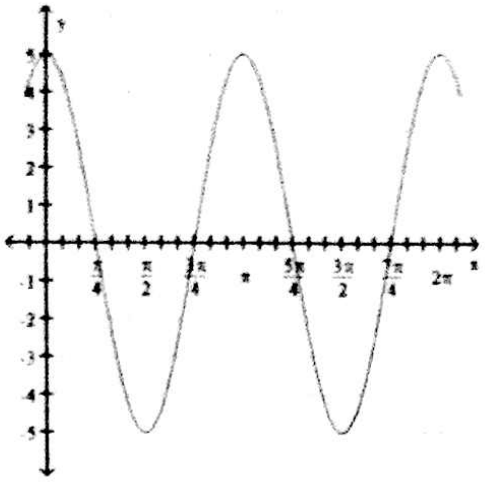
c) phase shift: left $\pi/2$

d) vertical shift: down 1



Determine the equation of the function that is graphed. (There may be more than one correct equation---you just need to list one).

11)

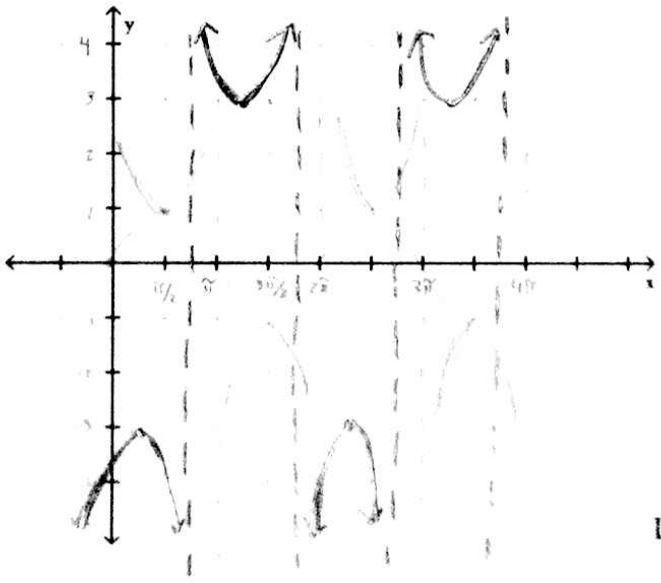


$y = 5\cos(2x)$

Graph the function for at least two complete periods clearly showing all asymptotes on the graph. Write an equation for all asymptotes.

12) $y = -3\csc\left(x + \frac{\pi}{4}\right)$

Asymptotes: $x = 3\pi/4 + \pi n$

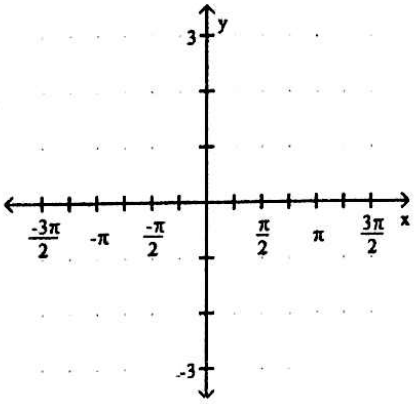


Label both axes with value of tick mark.

Choose which is the correct graph of the function.

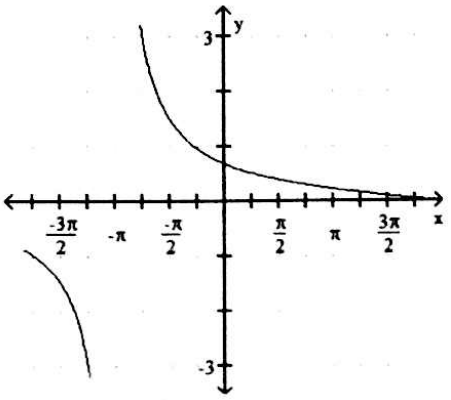
$\frac{2}{5}\cot\frac{2}{3}\left(x+\pi/4\right)$

↑ Period = $\frac{2\pi}{2/3} = 3\pi/2$

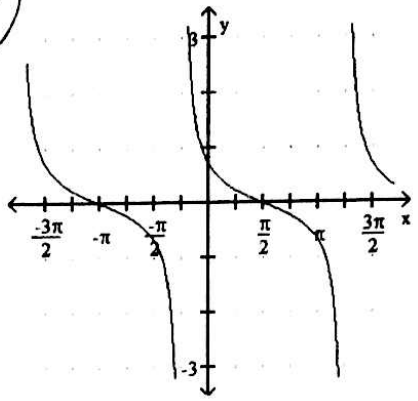


13) $y = \frac{2}{5}\cot\left(\frac{2}{3}x + \frac{\pi}{6}\right)$

A)



B)



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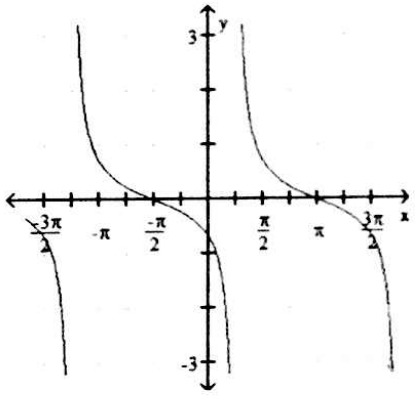
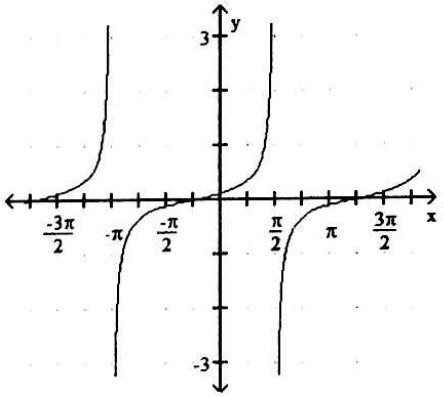


D)



Solve the problem.

14) The motion of a spring-mass system is described by the equation $y = 2\sin\left(\pi t - \frac{\pi}{2}\right)$ where y is the distance in feet from the equilibrium position and t is time in seconds. Find the distance from the equilibrium position of the weight at time t = 2.

$y = 2\sin\left(\pi(2) - \frac{\pi}{2}\right) = 2\sin\left(2\pi - \pi/2\right) = 2\sin\left(3\pi/2\right) = 2(-1) = -2$

2 feet below

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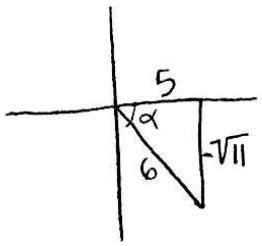
PART 2 – MAY USE CALCULATOR

Read directions carefully so that you answer what is asked. Show all appropriate work on the test.

Solve the problem.

1) Find $\tan\alpha$, given that $\cos\alpha = \frac{5}{6}$ and α is in quadrant IV.



$5^2 + b^2 = 6^2$

$b^2 = 11$

$\tan\alpha = \frac{opp}{adj} = \boxed{\frac{-\sqrt{11}}{5}}$

2) A wheel with a 22 inch diameter rim is turning at the rate of 46 revolutions per minute. To the nearest mile per hour, what is the <u>linear velocity</u> of a point on the rim? (Recall that 1 mile = 5280 feet)

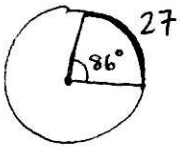
$V = r \cdot \omega$

$11\text{in} \cdot \frac{46\text{rev}}{1\text{min}} \cdot \frac{2\pi}{1\text{rev}} = \frac{11\text{in} \cdot 92\pi}{1\text{min}} \cdot \frac{1\text{ft}}{12\text{in}} \cdot \frac{1\text{mile}}{5280\text{ft}} \cdot \frac{60\text{min}}{1\text{hr}} \approx 3.0107\ \text{mile/hr}$

$= \boxed{3\text{ mph}}$

Find the radius of a circle with central angle α intercepting an arc of length s. Round answer to one decimal place.

3) $\alpha = 86°$, $s = 27$ in.



$S = r\theta$ (θ in radians) $\rightarrow$ $27 = r \cdot \frac{43\pi}{90}$

$86 \cdot \frac{2\pi}{360} = \frac{43\pi}{90}$

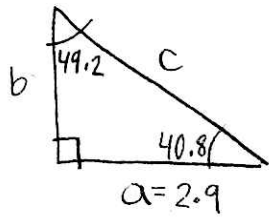
$\frac{27 \cdot 90}{43\pi} = r$

$17.988 \approx r$

$r = 18$

Solve the right triangle with the given side and angle. Round to the nearest tenth if necessary.

4) $a = 2.9$, $\beta = 40.8°$



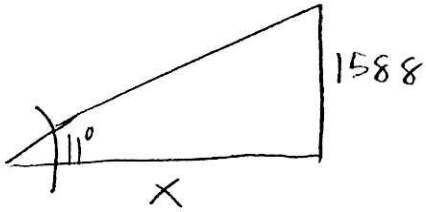
$\alpha = 49.2°$

$\tan(40.8) = \frac{b}{2.9} \rightarrow b = 2.5$

$\cos(40.8) = \frac{2.9}{c} \rightarrow c = 3.8$

Solve the problem.

5) From a boat on the river below a dam, the angle of elevation to the top of the dam is 11°. If the dam is 1588 feet above the level of the river, how far is the boat from the base of the dam (to the nearest foot)?



$\tan 11° = \frac{1588}{x}$

Rounded up to 8167

$x = 8169$ ft