

MA 158: Exam 3 Study Guide

1. You should be able to determine the inverse function of a given function.
  - a) Find  $f^{-1}(x)$ , given the function  $f(x) = 3x - 7$ .
  - b) Find  $f^{-1}(x)$ , given the function  $f(x) = -4x + 9$ .
  - c) Find  $f^{-1}(x)$ , given the function  $f(x) = \frac{1}{2}x + 6$ .
  - d) Find  $f^{-1}(x)$ , given the function  $f(x) = 5 - 2x$ .
  - e) Find  $f^{-1}(x)$ , given the function  $f(x) = x^3 + 1$ .
2. You should be able to find values of the inverse function given information about the original function and vice versa.
  - a) Assume  $f$  is a one-to-one function. If  $f(5) = -2$ , find  $f^{-1}(-2)$ .
  - b) Assume  $f$  is a one-to-one function. If  $f(-4) = 11$ , find  $f^{-1}(11)$ .
  - c) Assume  $f$  is a one-to-one function. If  $f(1/2) = 8$ , find  $f^{-1}(1/2)$ .
  - d) Assume  $f$  is a one-to-one function. If  $f^{-1}(2) = 5$ , find  $f(5)$ .
  - e) Assume  $f$  is a one-to-one function. If  $f^{-1}(-3) = 1$ , find  $f(1)$ .
  - f) Assume  $f$  is a one-to-one function. If  $f^{-1}(4) = -2$ , find  $f(-2)$ .
3. You should be able to find the functional value of exponential and logarithmic functions.

a) Given $f(x) = 5^x$ , evaluate $f(3)$ .	e) Evaluate $\log_3(-3)$ .
b) Given $f(x) = 2^x$ , evaluate $f(0)$ .	f) Evaluate $\log_2(8)$ .
c) Given $f(x) = 10^x$ , evaluate $f(-2)$ .	g) Evaluate $\ln(-1)$ .
d) Given $f(x) = 4^x$ , evaluate $f(1/2)$ .	h) Evaluate $\ln(1)$ .

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4. You should be able to rewrite from logarithmic form into exponential form and vice versa.

- a) Write the equation in exponential form:  $\ln(5) = x$
- b) Write the equation in exponential form:  $\log_3(7) = x$
- c) Write the equation in exponential form:  $\log_{10}(y) = 4$
- d) Write the equation in exponential form:  $\ln(a) = b$
- e) Given  $f(x) = \log_5(x)$ , find  $f^{-1}(x)$ .
- f) Given  $f(x) = \log_2(x)$ , find  $f^{-1}(x)$ .
- g) Given  $f(x) = \ln(x)$ , find  $f^{-1}(x)$ .
- h) Given  $f(x) = \log(x)$ , find  $f^{-1}(x)$ .

5. You should be able to expand logarithm expressions.

a) Expand the given logarithm as much as possible:

$$\ln\left(\frac{ab}{c}\right)^3$$

b) Expand the given logarithm as much as possible:

$$\log\left(\frac{x^2y}{z^3}\right)^2$$

c) Expand the given logarithm as much as possible:

$$\ln\left(\frac{m}{np}\right)^4$$

d) Expand the given logarithm as much as possible:

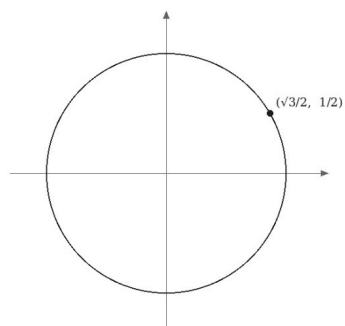
$$\log_5\left(\frac{a^4b^4}{c^2}\right)^{1/2}$$

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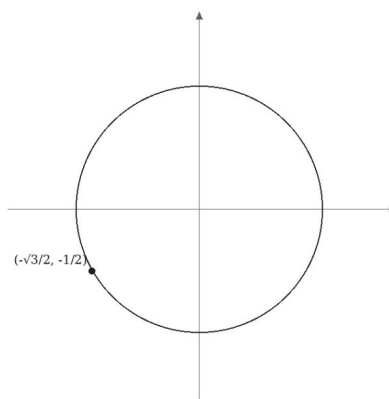
6. You should be able to solve a logarithmic equation.
- a) Solve the equation:  $\log_5(x^2 - 1) = \log_5(24)$
  - b) Solve the equation:  $\log_3(x^2 + 4) = \log_3(13)$
  - c) Solve the equation:  $\ln(x^2 - 1) = \ln(5)$
7. You should be able to solve an exponential equation.
- a) Solve the equation for the exact value(s) of  $x$ :  
$$e^{x^2} = e^{3x-4}$$
  - b) Solve the equation for the exact value(s) of  $x$ :  
$$e^{x^2+1} = e^{2x+7}$$
  - c) Solve the equation for the exact value(s) of  $x$ :  
$$e^{2x^2} = e^{x+6}$$
8. You should be able to determine which angles are coterminal with others.
- a) Which angles are coterminal with  $\theta = 45^\circ$ ?
  - b) Which angles are coterminal with  $\theta = -31^\circ$ ?
  - c) Which angles are coterminal with  $\theta = 123^\circ$ ?
  - d) Which angles are coterminal with  $\theta = \pi/4$ ?
  - e) Which angles are coterminal with  $\theta = -2\pi/3$ ?
  - f) Which angles are coterminal with  $\theta = 7\pi/6$ ?

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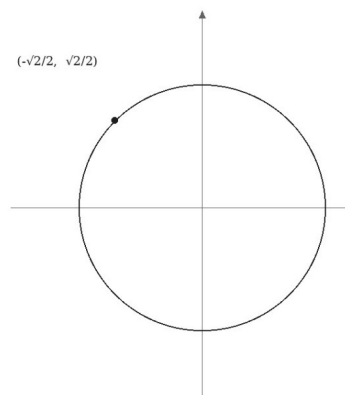
- g) The terminal side of which angle could intersect the unit circle at the point shown?



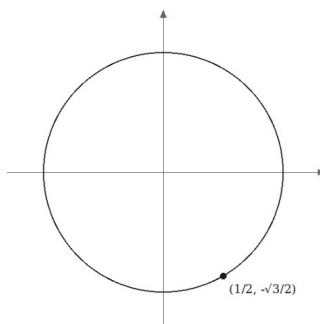
- i) The terminal side of which angle could intersect the unit circle at the point shown?



- h) The terminal side of which angle could intersect the unit circle at the point shown?



- j) The terminal side of which angle could intersect the unit circle at the point shown?



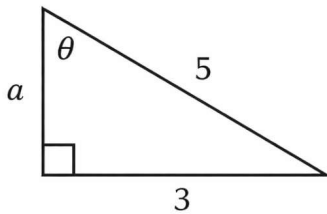
9. You should be able to determine the reference angle of a given angle.

- a) Find the reference angle  $\theta_R$  for  $\theta = 35^\circ$ .
- b) Find the reference angle  $\theta_R$  for  $\theta = 145^\circ$ .
- c) Find the reference angle  $\theta_R$  for  $\theta = 215^\circ$ .
- d) Find the reference angle  $\theta_R$  for  $\theta = 330^\circ$ .

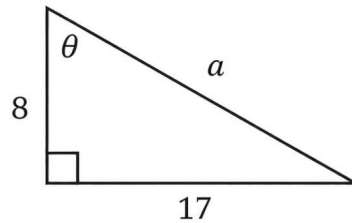
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10. You should be able to determine trigonometric values given a triangle.

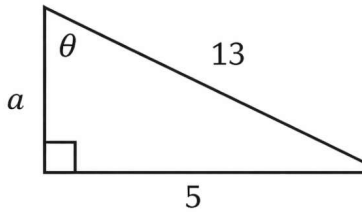
a) Given the triangle below, determine  $\sin \theta$ .



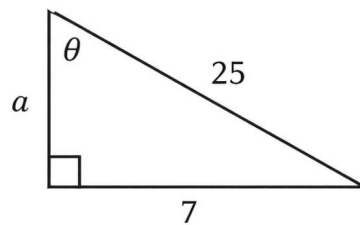
c) Given the triangle below, determine  $\cos \theta$



b) Given the triangle below, determine  $\tan \theta$



d) Given the triangle below, determine  $\csc \theta$



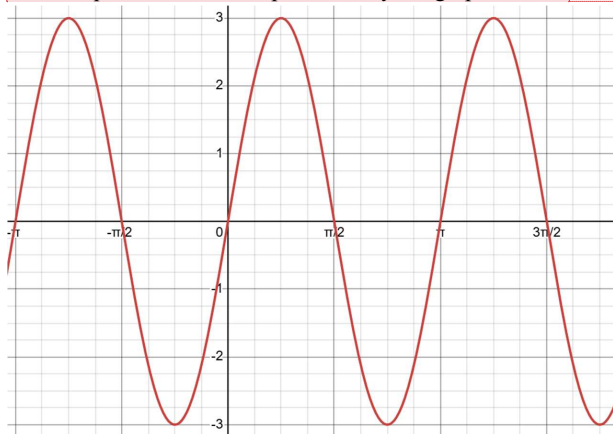
11. You should be able to determine trigonometric values given information about other trigonometric values or properties.

- Find  $\tan \theta$  if  $\sin \theta = 3/5$  and  $\cos \theta > 0$
- Find  $\sec \theta$  if  $\cos \theta = -4/5$  and  $\sin \theta > 0$
- Find  $\csc \theta$  if  $\sin \theta = -5/13$  and  $\cos \theta > 0$
- Find  $\cot \theta$  if  $\tan \theta = -2/3$  and  $\cos \theta > 0$
- Find  $\sin \theta$  if  $\sec \theta = 13/5$  and  $\tan \theta > 0$
- Find  $\cot \theta$  if  $\cos \theta = 1/2$  and  $\sin \theta > 0$

12. You should be able to determine the trigonometric function given the graph.

a) Which equation could be represented by the graph shown?

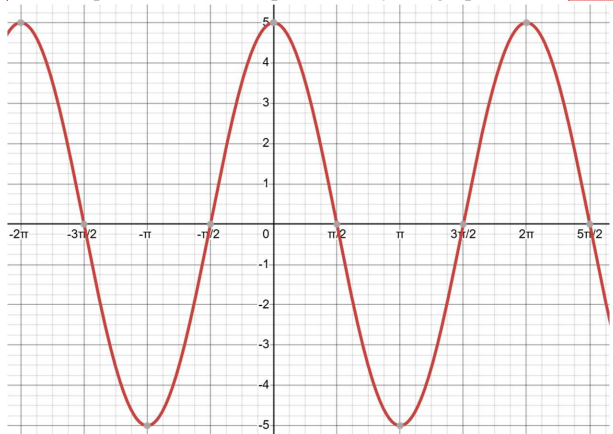
Commented [ac1]:  $Y=3\sin(2x)$



- A.  $y = 3\sin(2x)$
- B.  $y = 2\sin(3x)$
- C.  $y = 3\cos(2x)$
- D.  $y = -3\sin(2x)$
- E.  $y = \sin(2x)$

b) Which equation could be represented by the graph shown?

Commented [ac2]:  $Y=5\cos(x)$

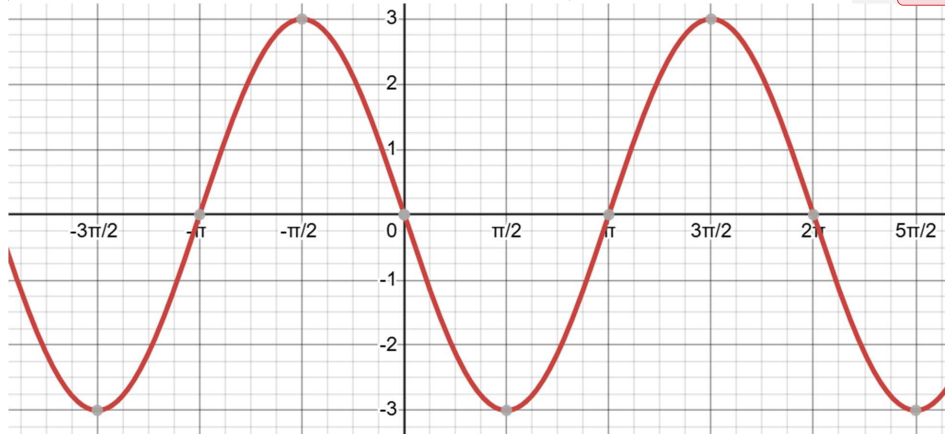


- A.  $y = 5\cos(x)$
- B.  $y = 5\sin(x)$
- C.  $y = -5\cos(x)$
- D.  $y = \cos(x)$
- E.  $y = 5\cos(2x)$

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c) Which equation could be represented by the graph shown?

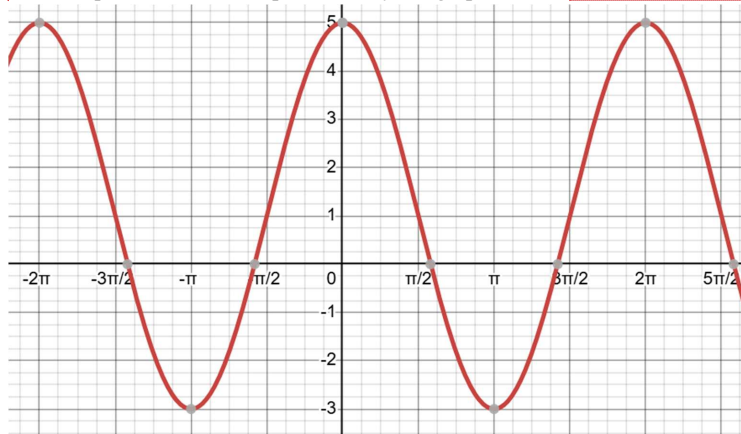
Commented [ac3]:  $Y=-3\sin(x)$



- A.  $y = -3\sin(x)$
- B.  $y = 3\sin(x)$
- C.  $y = -3\cos(x)$
- D.  $y = \sin(x)$
- E.  $y = -3\sin(2x)$

d) Which equation could be represented by the graph shown?

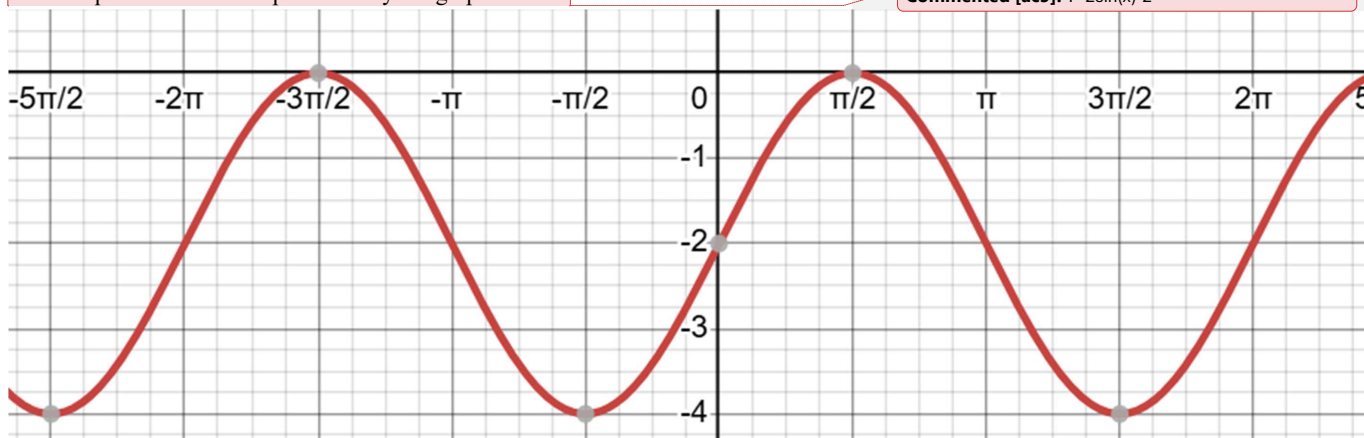
Commented [ac4]:  $Y=4\cos(x)+1$



- A.  $y = 4\cos(x) + 1$
- B.  $y = 4\cos(x) - 1$
- C.  $y = -4\cos(x) + 1$
- D.  $y = \cos(x) + 1$
- E.  $y = 4\cos(2x) + 1$

e) Which equation could be represented by the graph shown?

Commented [ac5]:  $Y=2\sin(x)-2$

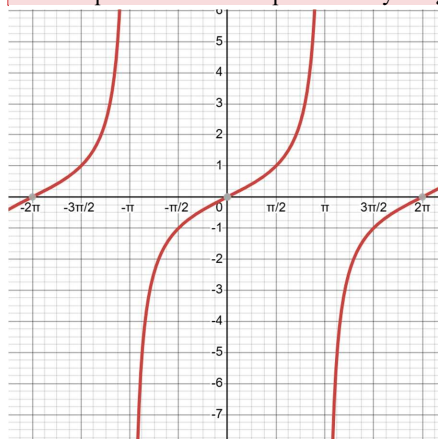


- A.  $y = 2 \sin(x) - 2$
- B.  $y = 2 \sin(x) + 2$
- C.  $y = -2 \sin(x) - 2$

- D.  $y = \sin(x) - 2$
- E.  $y = 2 \sin(2x) - 2$

f) Which equation could be represented by the graph shown?

Commented [ac6]:  $Y=\tan(1/2x)$



- A.  $y = \tan\left(\frac{1}{2}x\right)$
- B.  $y = \tan(2x)$
- C.  $y = \frac{1}{2}\tan(x)$
- D.  $y = -\tan\left(\frac{1}{2}x\right)$
- E.  $y = \tan(x)$