

Student: \_\_\_\_\_  
Date: \_\_\_\_\_

Instructor: Melanie Laber  
Course: Precalculus (1)

Assignment: PreCalc Semester 2 Test Out

1. Convert the angle in degrees to radians.

$$435^\circ$$

$$435^\circ = \boxed{\phantom{000}} \text{ radians}$$

(Simplify your answer. Type an exact answer, using  $\pi$  as needed. Use integers or fractions for any numbers in the expression.)

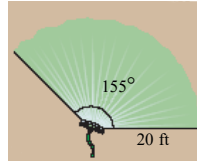
2. Convert the angle in radians to degrees.

$$-\frac{5\pi}{12}$$

$$-\frac{5\pi}{12} = \boxed{\phantom{000}}^\circ$$

(Simplify your answer.)

3. A water sprinkler sprays water over a distance of 20 feet while rotating through an angle of  $155^\circ$ . What area of lawn receives water?



The portion of lawn that receives water has an area of  $\boxed{\phantom{000}}$  (1) \_\_\_\_\_  
(Type an integer or decimal rounded to two decimal places as needed.)

- (1) ☐ feet.  
☐  $\text{feet}^2$ .  
☐ radians.

4. Find the exact value of each of the remaining trigonometric functions of  $\theta$ .

$$\sin \theta = -\frac{12}{13}, 180^\circ < \theta < 270^\circ$$

$$\cos \theta = \boxed{\phantom{000}}$$

(Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression.)

$$\tan \theta = \boxed{\phantom{000}}$$

(Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression.)

$$\cot \theta = \boxed{\phantom{000}}$$

(Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression.)

$$\sec \theta = \boxed{\phantom{000}}$$

(Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression.)

$$\csc \theta = \boxed{\phantom{000}}$$

(Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression.)

5. Use the even-odd properties to find the exact value of the given expression. Do not use a calculator.

$$\sin(-\pi)$$

$$\sin(-\pi) = \boxed{\phantom{000}}$$

(Type an exact answer, using radicals as needed. Simplify your answer, including any radicals.)

6. If  $\tan \theta = 7 - \sec \theta$  with  $\theta$  in quadrant I, what is  $\sin \theta + \cos \theta$ ?

$$\sin \theta + \cos \theta = \boxed{\phantom{000}}$$

(Type an integer or a simplified fraction.)

7. Write the equation of a sine function with Amplitude = 6 and Period = 4.

Type the equation in the form  $y = A \sin(\omega x)$  or  $y = A \cos(\omega x)$  with  $\omega > 0$ . Select the correct choice below and fill in the answer box to complete your choice.

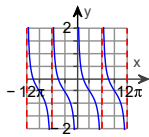
- ☐ A. There are two equations; the equation when  $A < 0$  is  $y = \boxed{\phantom{000}}$  and the equation when  $A > 0$  is  $y = \boxed{\phantom{000}}$ .  
(Simplify your answers. Type an exact answer, using  $\pi$  as needed. Use integers or fractions for any numbers in the expression.)
- ☐ B. There are two equations with  $A > 0$ ,  $y = \boxed{\phantom{000}}$  and  $y = \boxed{\phantom{000}}$ .  
(Simplify your answers. Type an exact answer, using  $\pi$  as needed. Use integers or fractions for any numbers in the expression.)
- ☐ C. There is one equation. It is  $y = \boxed{\phantom{000}}$ .  
(Simplify your answers. Type an exact answer, using  $\pi$  as needed. Use integers or fractions for any numbers in the expression.)

8. Graph the following function. Show at least two cycles. Use the graph to determine the domain and range of the function.

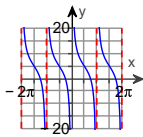
$y = \cot\left(\frac{1}{6}x\right) - 5$

Choose the correct graph below.

☐ A.



☐ B.



☐ C.



Use the graph to determine the domain of  $y = \cot\left(\frac{1}{6}x\right) - 5$ .

- ☐ A.  $\{x|x \neq 6k\pi, k \text{ is an integer}\}$
- ☐ B. All real numbers
- ☐ C.  $\left\{x|x \neq \frac{k}{4}, k \text{ is an odd integer}\right\}$
- ☐ D.  $\{x|x \neq k\pi, k \text{ is an integer}\}$

Use the graph to determine the range of  $y = \cot\left(\frac{1}{6}x\right) - 5$ .

- ☐ A.  $\{y|y \geq -20 \text{ and } y \leq 20\}$
- ☐ B.  $\{y|y \leq 20\}$
- ☐ C. All real numbers
- ☐ D.  $\{y|y \geq 20\}$

9. Find the amplitude (if one exists), period, and phase shift of the function. Graph the function. Show at least two periods.

$y = 2 \sin(\pi x + 1) - 2$

What is the amplitude? Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- ☐ A. The amplitude is  .  
(Simplify your answer. Type an exact answer, using  $\pi$  as needed in the expression.)
- ☐ B. The function does not have an amplitude.

What is the period?

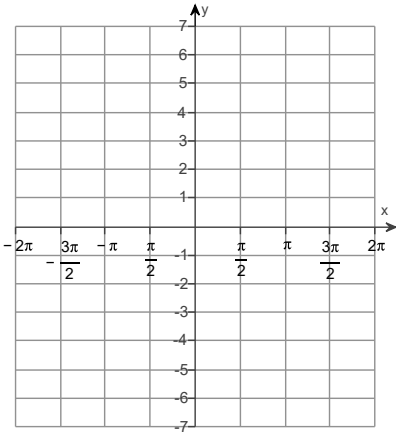
(Simplify your answer. Type an exact answer, using  $\pi$  as needed. Use integers or fractions for any numbers in the expression.)

What is the phase shift?

(Simplify your answer. Type an exact answer, using  $\pi$  as needed. Use integers or fractions for any numbers in the expression.)

Use the graphing tool to graph the function.

(For any answer boxes shown with the grapher, type an exact answer. Type the word pi to insert the symbol  $\pi$  as needed.)



10. Find the exact value of the expression.

$\csc^{-1}(-1)$

Choose the correct answer below and, if necessary, fill in the answer box to complete your choice.

- ☐ A.  $\csc^{-1}(-1) = \text{}$   
(Simplify your answer. Type an exact answer, using  $\pi$  as needed. Use integers or fractions for any numbers in the expression.)
- ☐ B. There is no solution.

11. Find the real solutions of the following equation.

$(9x + 8)^2 - 2(9x + 8) - 15 = 0$

Select the correct choice below, and if necessary, fill in the answer box within your choice.

- ☐ A. The solution set is {  }.  
(Simplify your answer. Type an exact answer, using radicals as needed. Use a comma to separate answers as needed.)
- ☐ B. There are no real solutions.

12. Solve the equation on the interval  $0 \leq \theta < 2\pi$ .

$6 \sin \theta - 3 = 0$

What are the solutions to  $6 \sin \theta - 3 = 0$  in the interval  $0 \leq \theta < 2\pi$ ? Select the correct choice and fill in any answer boxes in your choice below.

- ☐ A. The solution set is {  }.  
(Simplify your answer. Type an exact answer, using  $\pi$  as needed. Type your answer in radians. Use integers or fractions for any
- ☐ B. There is no solution.

13. Solve the equation on the interval  $0 \leq \theta < 2\pi$ .

$8 \cos^2 \theta = 2$

What are the solutions in the interval  $0 \leq \theta < 2\pi$ ? Select the correct choice and fill in any answer boxes in your choice below.

- ☐ A. The solution set is {  }.  
(Simplify your answer. Type an exact answer, using  $\pi$  as needed. Type your answer in radians. Use integers or fractions for any
- ☐ B. There is no solution.

14. Complete the following equation.

$\tan^2 \theta - \sec^2 \theta = \underline{\hspace{1cm}}$

$\tan^2 \theta - \sec^2 \theta = \text{}$

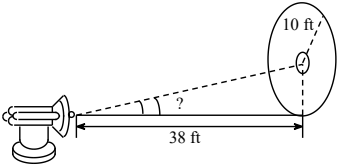
15. Rewrite  $\frac{\csc \theta}{\cot \theta}$  in terms of sine and cosine.

$\frac{\csc \theta}{\cot \theta} = \text{}$  (Simplify your answer.)

16. Find the exact value of  $\cos \theta$  if  $\sin \theta = \frac{3}{5}$ ,  $\theta$  in Quadrant I.

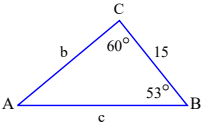
$\cos \theta = \text{}$   
(Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression.)

17. A laser beam is to be directed through a small hole in the center of a circle of radius 10 feet. The origin of the beam is 38 feet from the circle. At what angle of elevation should the beam be aimed to ensure that it goes through the hole?



The beam should be aimed at an angle of °.  
(Round to the nearest tenth as needed.)

18. Solve the triangle shown to the right.



$A \approx \text{}^\circ$   
(Simplify your answer.)

$b \approx \text{}$   
(Type an integer or decimal rounded to two decimal places as needed.)

$c \approx \text{}$   
(Type an integer or decimal rounded to two decimal places as needed.)

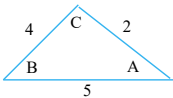
19. Two sides and an angle are given below. Determine whether the given information results in one triangle, two triangles, or no triangle at all. Solve any resulting triangle(s).

$a = 7, b = 1, A = 70^\circ$

Select the correct choice below and, if necessary, fill in the answer boxes to complete your choice.  
(Type an integer or decimal rounded to two decimal places as needed.)

- ☐ A. A single triangle is produced, where  $B \approx \text{[ ]}^\circ$ ,  $C \approx \text{[ ]}^\circ$ , and  $c \approx \text{[ ]}$ .
- ☐ B. Two triangles are produced, where the triangle with the smaller angle B has  $B_1 \approx \text{[ ]}^\circ$ ,  $C_1 \approx \text{[ ]}^\circ$ , and  $c_2 \approx \text{[ ]}$ .
- ☐ C. No triangles are produced.

20. Solve the triangle.



- $A \approx \text{[ ]}^\circ$  (Round to one decimal place as needed.)
- $B \approx \text{[ ]}^\circ$  (Round to one decimal place as needed.)
- $C \approx \text{[ ]}^\circ$  (Round to one decimal place as needed.)

21. Find the area K of the triangle.

$b = 2, c = 8, A = 70^\circ$

$K = \text{[ ]}$  square units  
(Do not round until the final answer. Then round to two decimal places as needed.)

22. Choose the figure that shows an angle of  $\frac{\pi}{2}$  radians in standard position.

Choose the correct answer below.

- ☐ A.
- ☐ B.
- ☐ C.

23. For the point with polar coordinates  $\left(1, -\frac{\pi}{2}\right)$ , which of the following best describes the location of the point in a rectangular coordinate system?

Choose the correct answer below.

- ☐ in quadrant IV
- ☐ in quadrant II
- ☐ on the x-axis
- ☐ on the y-axis

24. The point  $\left(8, \frac{\pi}{4}\right)$  can also be represented by which of the following polar coordinates?

Select all that apply.

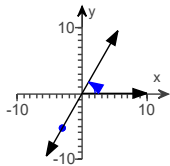
- ☐ A.  $\left(8, -\frac{\pi}{4}\right)$
- ☐ B.  $\left(-8, \frac{9\pi}{4}\right)$
- ☐ C.  $\left(8, \frac{3\pi}{4}\right)$
- ☐ D.  $\left(-8, \frac{5\pi}{4}\right)$

25. Plot the point given in polar coordinates.

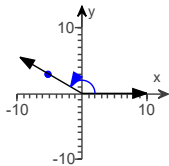
$$\left(-6, \frac{5\pi}{6}\right)$$

Choose the correct graph below.

☐ A.



☐ B.



☐ C.



26. The polar coordinates of a point are  $\left(11, \frac{\pi}{2}\right)$ . Find the rectangular coordinates of this point.

The rectangular coordinates are .

(Simplify your answer. Type an ordered pair. Type an exact answer for each coordinate, using radicals as needed. Use integers or fractions for any numbers in the expression.)

27. The rectangular coordinates of a point are given. Find polar coordinates for the point.

$$(5, 5\sqrt{3})$$

One possibility for the polar coordinates of this point is .

(Type an ordered pair. Type the coordinate for  $\theta$  in radians. Use angle measures greater than or equal to 0 and less than  $2\pi$ . Type an exact answer, using  $\pi$  as needed. Use integers or fractions for any numbers in the expression.)

28. Find the exact value of the following expression.

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

$$\cos\left(\frac{5\pi}{3}\right) = \text{$$

(Simplify your answer. Type an exact answer, using radicals as needed. Use integers or fractions for any numbers in the expression. Rationalize all denominators.)

29. Solve the given system of equations. If the system has no solution, say that it is inconsistent.

$$\begin{cases} x - 3y + 4z = 11 \\ 2x + y + z = -6 \\ -2x + 3y - 3z = -8 \end{cases}$$

Select the correct choice below and fill in any answer boxes within your choice.

- ☐ A. The solution is  $x = \text{$ ,  $y = \text{$ , and  $z = \text{$ . (Type integers or simplified fractions.)
- ☐ B. There are infinitely many solutions. Using ordered triplets, they can be expressed as  $\{(x, y, z) \mid x = \text{$ ,  $y = \text{$
- (Simplify your answers. Type expressions using  $z$  as the variable as needed.)
- ☐ C. There are infinitely many solutions. Using ordered triplets, they can be expressed as  $\{(x, y, z) \mid x = \text{$ ,  $y$  any real num
- (Simplify your answer. Type an expression using  $y$  and  $z$  as the variables as needed.)
- ☐ D. The system is inconsistent.

30. Write the partial fraction decomposition of the given rational expression.

$$\frac{15}{x(x-5)}$$

What is the partial fraction decomposition?

$$\frac{15}{x(x-5)} = \text{$$

31. Write the partial fraction decomposition of the given rational expression.

$$\frac{x}{x^2 + 5x - 14}$$

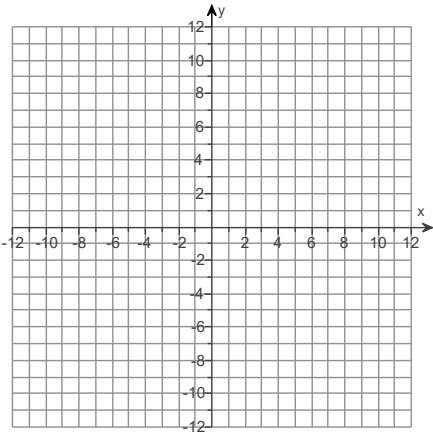
What is the partial fraction decomposition?

$$\frac{x}{x^2 + 5x - 14} = \text{$$

(Use integers or fractions for any numbers in the expression.)

32. Graph each equation of the system. Then solve the system to find the points of intersection.

$$\begin{cases} y = x^2 + 6 \\ y = 2x + 6 \end{cases}$$



Use the graphing tool to graph the system.

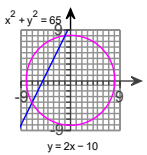
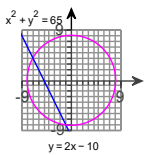

List all the solutions. Select the correct choice below and fill in any answer boxes in your choice.

- ☐ A. The graphs intersect at .  
(Type an ordered pair. Use a comma to separate answers as need
- ☐ B. There is no solution.

33. Graph each equation of the system. Solve the system to find the points of intersection.

$$\begin{cases} y = 2x - 10 \\ x^2 + y^2 = 65 \end{cases}$$

Which of the following shows the graph of the equations?

- ☐ A. 
- ☐ B. 
- ☐ C. 

What is the solution? Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- ☐ A. The graphs intersect at .  
(Type an ordered pair. Use a comma to separate answers as needed. Type an exact answer, using radicals as needed. Simplify y
- ☐ B. There is no solution.

34. Find the principal needed now to get the given amount; that is, find the present value.

To get \$100 after 3 years at 8% compounded monthly

The present value of \$100 is \$ .  
(Round to the nearest cent as needed.)

35. A sequence is defined recursively. Write the first five terms.

$$a_1 = 5; \quad a_n = 1 - a_{n-1}$$

Type the first five terms of the sequence.

$a_1 =$

$a_2 =$

$a_3 =$

$a_4 =$

$a_5 =$

36. A sequence is defined recursively. Write the first five terms.

$a_1 = 5; \quad a_n = 2a_{n-1}$

Type the first five terms of the sequence.

$a_1 =$

$a_2 =$

$a_3 =$

$a_4 =$

$a_5 =$

37. Find the  $n$ th term of the arithmetic sequence  $\{a_n\}$  whose initial term  $a$  and common difference  $d$  are given. What is the forty-third term?

$a_1 = -1; \quad d = 3$

$a_n =$

(Simplify your answer. Use integers or fractions for any numbers in the expression.)

$a_{43} =$

(Simplify your answer.)

38. Find the fifth term and the  $n$ th term of the geometric sequence whose initial term  $a_1$  and common ratio  $r$  are given.

$a_1 = -8, \quad r = 5$

The fifth term of the geometric sequence is  $a_5 =$  .  
(Simplify your answer.)

The  $n$ th term of the geometric sequence is  $a_n =$  .  
(Simplify your answer.)

39. Find the indicated term of the geometric sequence.

6th term of  $3, \frac{3}{4}, \frac{3}{16}, \dots$

Enter the 6th term of the geometric sequence.

$a_6 =$   (Type an integer or a simplified fraction.)

40. Determine whether the given sequence is arithmetic, geometric, or neither. If the sequence is arithmetic, find the common difference; if it is geometric, find the common ratio. If the sequence is arithmetic or geometric, find the sum of the first 50 terms.

$-9, 63, -441, 3087, \dots$

What type of sequence is  $-9, 63, -441, 3087, \dots$ ?

- ☐ Arithmetic ☐ Geometric

Select the correct choice below and fill in any answer boxes in your choice.

- ☐ **A.** The value of the common difference is .  
(Type an integer or a simplified fraction.)
- ☐ **B.** The value of the common ratio is .  
(Type an integer or a simplified fraction.)
- ☐ **C.** There is no common difference or common ratio.

Select the correct choice below and fill in any answer boxes in your choice.

- ☐ **A.** The sum of the first 50 terms is .  
(Use scientific notation. Use the multiplication symbol in the math palette as needed. Round to three decimal places as needed.)
- ☐ **B.** The sequence is not arithmetic or geometric.

41. Use a table to find the indicated limit.

$$\lim_{x \rightarrow -2} (-3x^2)$$

Select the correct choice below and fill in any answer boxes in your choice.

☐ A.  $\lim_{x \rightarrow -2} (-3x^2) =$   (Type an exact answer.)

☐ B. The limit does not exist.

42. Use a table to find the indicated limit.

$$\lim_{x \rightarrow 0} \frac{x+8}{x^2+4}$$

Select the correct choice below and fill in any answer boxes in your choice.

☐ A.  $\lim_{x \rightarrow 0} \frac{x+8}{x^2+4} =$

☐ B. The limit does not exist.

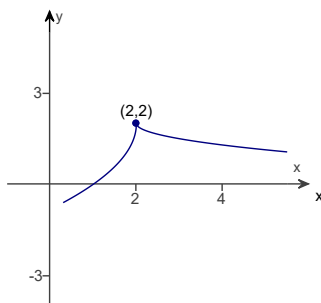
43. Use the graph shown to determine if the limit exists. If it does, find its value.

$$\lim_{x \rightarrow 2} f(x)$$

Select the correct choice below and fill in any answer boxes in your choice.

☐ A.  $\lim_{x \rightarrow 2} f(x) =$

☐ B. The limit does not exist.



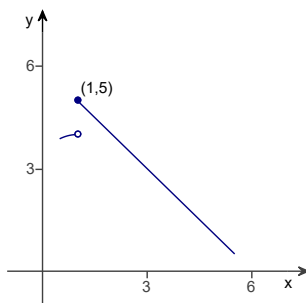
44. Use the graph shown to determine if the limit exists. If it does, find its value.

$$\lim_{x \rightarrow 1} f(x)$$

Select the correct choice below and fill in any answer boxes in your choice.

☐ A.  $\lim_{x \rightarrow 1} f(x) =$

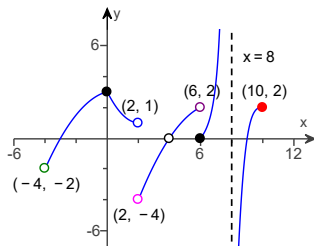
☐ B. The limit does not exist.



45. Find  $f(10)$  and  $f(0)$ .

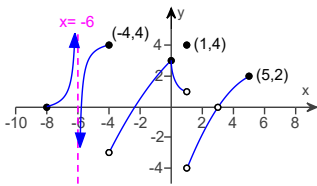
$f(10) =$   (Type an integer.)

$f(0) =$   (Type an integer.)





46. Find  $\lim_{x \rightarrow -6^-} f(x)$ .

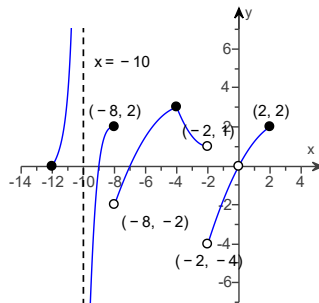


$\lim_{x \rightarrow -6^-} f(x) =$

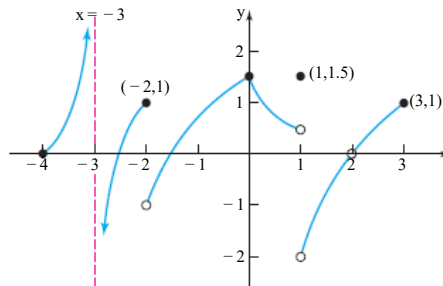
47. Use the accompanying graph of  $y = f(x)$ . Does  $\lim_{x \rightarrow 0} f(x)$  exist? If it does, what is it?

Select the correct choice below and fill in any answer boxes in your choice.

- ☐ A.  $\lim_{x \rightarrow 0} f(x) =$
- ☐ B.  $\lim_{x \rightarrow 0} f(x)$  does not exist.



48. Use the graph of  $y = f(x)$  shown at right to determine whether  $f$  is continuous at 2.



Is  $f$  continuous at 2? Choose the correct answer below.

- ☐ A. No, because  $f$  is not defined at 2.
- ☐ B. No, because  $\lim_{x \rightarrow 2^-} f(x) \neq f(2)$ .
- ☐ C. No, because  $\lim_{x \rightarrow 2^+} f(x) \neq f(2)$ .
- ☐ D. Yes,  $f$  is continuous at 2.

49. Determine whether  $f$  is continuous at  $c$ .

$$f(x) = \frac{x+10}{x-10}, c = 10$$

Is  $f$  continuous at  $c = 10$ ? Select the correct answer below and, if necessary, fill in the answer box to complete your choice.

- ☐ A. Yes, because  $\lim_{x \rightarrow c} f(x) = f(c) =$  . (Type an integer or a simplified fraction.)
- ☐ B. No, because  $f(c)$  is not defined.
- ☐ C. No, because  $\lim_{x \rightarrow c} f(x)$  does not exist.
- ☐ D. No, because  $\lim_{x \rightarrow c} f(x) \neq f(c)$ .