Student: _____ Date: _____	Instructor: Joseph Bradshaw Course: AP Calculus BC	Assignment: Summer Assignment

1. Write an equation for a line through P that is **(a)** parallel to line L and **(b)** perpendicular to line L.

   P(5, −2), L: 5x + y = 3

   (a) What is the equation of a line through P and parallel to L?

   [ ]

   (b) What is the equation of a line through P and perpendicular to L?

   [ ]

2. Find the unique pair (x,y) that satisfies both equations simultaneously.

   4x − y = 23 and 7x + y = 65

   The solution of the system is [ ]. (Type an ordered pair.)

3. For what value of k are the two lines 3x + ky = 1 and x + y = 1 **(a)** parallel? **(b)** perpendicular?

   (a) If the two lines 3x + ky = 1 and x + y = 1 are parallel, then k = [ ].

   (b) If the two lines 3x + ky = 1 and x + y = 1 are perpendicular, then k = [ ].

4. For the function, **(a)** identify the domain and range and **(b)** sketch the graph of the function.

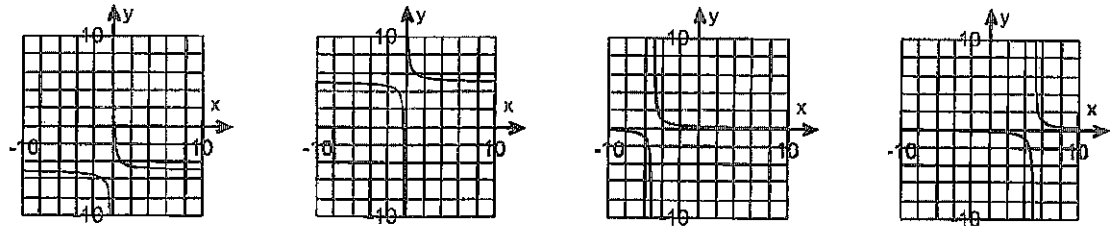
   $$y = \frac{1}{x+5}$$

   (a) The domain is [ ]. (Type your answer in interval notation.)

   The range is [ ]. (Type your answer in interval notation.)

   (b) Choose the correct graph below.

   ○ **A.** ○ **B.** ○ **C.** ○ **D.**



5. Use a grapher to (a) identify the domain and range and (b) draw the graph of the function.

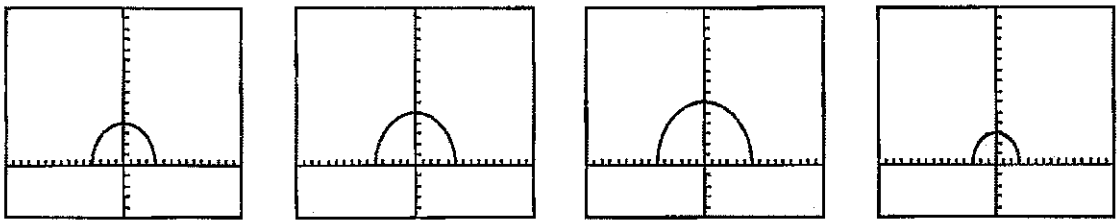
$y = \sqrt{9 - x^2}$

(a) The domain of the function is [ ].
(Simplify your answer. Use interval notation.)

The range of the function is [ ].
(Simplify your answer. Use interval notation.)

(b) Choose the correct graph of the function.

○ A. ○ B. ○ C. ○ D.



[−15, 15] by [−5, 15]

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6. Determine whether the function is even, odd, or neither.

$f(x) = 5x^3 - 8x$

Select the correct choice below.

○ A. The function is even because $f(-x) = f(x)$.
○ B. The function is neither because $f(-x) \neq -f(x)$ and $f(-x) \neq -f(x)$.
○ C. The function is odd because $f(-x) = f(x)$.
○ D. The function is even because $f(-x) = -f(x)$.
○ E. The function is odd because $f(-x) = -f(x)$.

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7. Find (a) f(g(x)), (b) g(f(x)), (c) f(g(0)), (d) g(f(0)), (e) g(g(−3)) and (f) f(f(x)).

$f(x) = x + 7$; $g(x) = x^2 - 4$

(a) f(g(x)) = [ ]

(b) g(f(x)) = [ ]

(c) f(g(0)) = [ ]

(d) g(f(0)) = [ ]

(e) g(g(−3)) = [ ]

(f) f(f(x)) = [ ]

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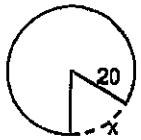
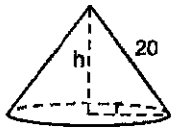
8. Begin with a circular piece of paper with a 20-in. radius, as shown to the right. Cut out a sector with an arc length of x. Join the two edges of the remaining portion to form a cone with radius r and height h, as shown to the right.





a. Express the circumference C of the base of the cone as a function of x.

C = ☐

(Type an exact answer, using π as needed.)

b. Express the radius r as a function of x.

r = ☐

(Type an exact answer, using π as needed.)

c. Express the height h as a function of x.

h = ☐

(Type an exact answer, using π as needed.)

d. Express the volume V of the cone as a function of x.

V = ☐

(Type an exact answer, using π as needed.)

9. Rewrite the exponential expression to have the indicated base.

$y = 4^{2x}$, base 2

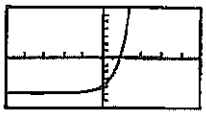
y = ☐

10. Use a graph to find the zeros of the function.

$f(x) = 5^x - 6$

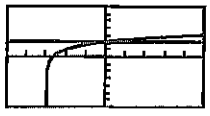
Graph the function. Choose the correct graph below.

○ **A.**



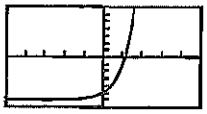
[−5,5] by [−7,7]

○ **B.**



[−5,5] by [−7,7]

○ **C.**



[−5,5] by [−7,7]

○ **D.**

[−5,5] by [−7,7]

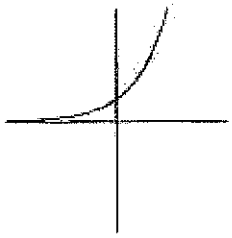
f(x) has a zero at approximately ☐.

(Round to the nearest thousandth.)

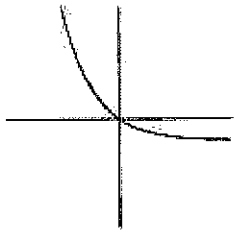
11. Match the function with its graph. Try to do it without using your grapher.

$y=2^{-x}-1$	$y=-5^{-x}$	$y=-0.5^{-x}$	$y=2^{x}$	$y=5^{-x}$	$y=1.3^{x}-1$

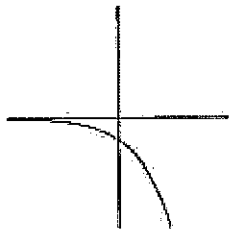
Drag each of the equations above to the correct graph label below.



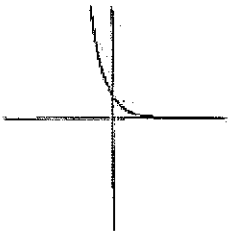
(a)



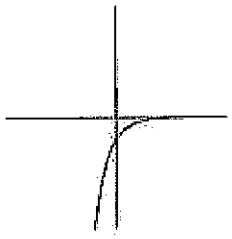
(b)



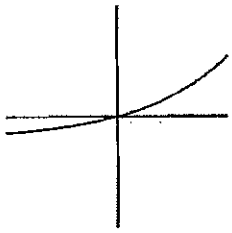
(c)



(d)



(e)



(f)

12. The half-life of a certain radioactive substance is 13 days. There are 2.5 grams of the substance initially. Type an expression for the amount of substance as a function of t. When will there be less than 1 g remaining?

What is the expression?

f(t) = [ ]
(Simplify your answer.)

There will be less than 1 g remaining after about [ ] days.
(Round to the three decimal places as needed.)

13. Determine how much time is required for an investment to double in value if interest is earned at the rate of 6.25% compounded continuously.

The investment will double in value in [ ] years.
(Round to three decimal places as needed.)

14. Solve the equation algebraically. Check your solution graphically.

$(1.085)^t = 3$

$t =$ [ ] (Do not perform the calculation.)

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15. Solve for y.

$\ln y = 9t + 5$

$y =$ [ ] (Type an exact answer.)

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16. The population of Glenbrook is 325,000 and is increasing at the rate of 2.5% per year. Predict when the population will be 820,000.

Express the population as a function of time t.

$P(t) =$ [ ]

Predict when the population will be 820,000.

The population will be 820,000 in about [ ] years.
(Do not round until the final answer. Then round to three decimal places as needed.)

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17. What is the domain of $f(x) = 5 - \ln(x + 2)$?

Choose the correct answer below.

- ○ **A.** $(0, \infty)$
- ○ **B.** $(-\infty, \infty)$
- ○ **C.** $(-2, \infty)$
- ○ **D.** $x \neq -2$

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18. Find the arc length subtended on a circle of radius 4 by a central angle of measure $\frac{\pi}{4}$.

$r = 4, s =$ [ ], $\theta = \frac{\pi}{4}$

(Type an exact answer, using π as needed.)

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19. A function value and a quadrant are given. Find the other five function values. Give exact answers.

$\cos\theta = -\frac{40}{41}$, $\sin\theta > 0$

$\sin\theta =$ [ ] $\tan\theta =$ [ ]

$\csc\theta =$ [ ] $\sec\theta =$ [ ] $\cot\theta =$ [ ]

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20. Determine **(a)** the period, **(b)** the domain **(c)** the range and **(d)** draw the graph of the function.

$y = 5\tan(4x - \pi) + 1$

(a) What is the period of $y = 5\tan(4x - \pi) + 1$?

[ ]

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

(b) What is the domain of $y = 5\tan(4x - \pi) + 1$?

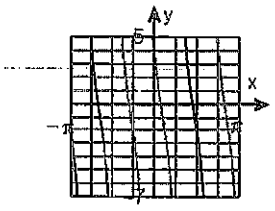
- **A.** $x \neq 8k\pi$ for all odd integers k
- **B.** $x \neq \frac{k\pi}{4}$ for all odd integers k
- **C.** $x \neq \frac{k\pi}{8}$ for all odd integers k
- **D.** $-\infty < x < \infty$

(c) What is the range of $y = 5\tan(4x - \pi) + 1$?

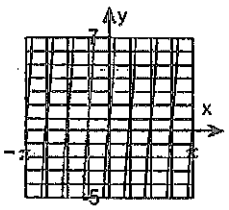
- **A.** $(-\infty, -5] \cup [5, \infty)$
- **B.** $(-\infty, -4] \cup [6, \infty)$
- **C.** $-5 \leq x \leq 5$
- **D.** $-\infty < y < \infty$

(d) Choose the correct graph of $y = 5\tan(4x - \pi) + 1$.

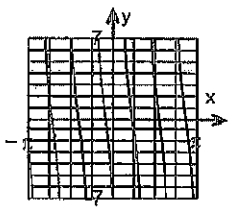
A.



B.



C.



D.