

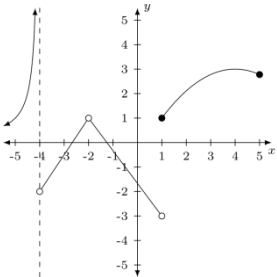
1. Simplify the following rational expression:

$$\frac{\frac{1}{x} - \frac{1}{3}}{\frac{1}{x^2} - \frac{1}{9}}$$

2. Find the following limit:

$$\lim_{x \rightarrow 5} \frac{x - 5}{x^2 - 25}$$

3. Find the limits, if they exist:



a. $\lim_{x \rightarrow -4^-} f(x)$

b. $\lim_{x \rightarrow -2} f(x)$

4. Simplify the logarithmic expressions:

a. $\log_5 27 - 2 \log_5 3$

b. $4^{3 \log_4 3}$

5. Factor each expression completely:

a. $9x^3 + 9x^2 - x - 1$

b. $p^3 - 64$

6. Solve for x in each equation:

a. $\frac{1}{8} = 2^{1-2x}$

b. $\log_3 x + 2 \log_3 2 = 4 \log_3 2$

7. Rewrite the formula and solve for h :

$$S = 2\pi r^2 + 2\pi r h$$

8. Find the following limit:

$$\lim_{x \rightarrow 4} \frac{x^2 - 5x + 4}{x^2 - 2x - 8}$$

9. Find the following limit:

$$\lim_{x \rightarrow 3} \frac{\sqrt{x+1} - 2}{x-3}$$

10. Find all solutions, real and imaginary, for:

a. $x^4 - 9x^2$

b. $m^4 - 16$

<p>11. Find the following limit:</p> $\lim_{x \rightarrow \infty} \frac{3x^2}{x^2 + 1}$	<p>12. Find the following limit:</p> $\lim_{x \rightarrow 3} \frac{x - 2}{x^2 - 4x + 3}$
<p>13. Write an equation for a line tangent to the circle $(x + 3)^2 + (y - 2)^2 = 10$ that passes through the coordinates where $x = -2$.</p>	<p>14. Find the solution to the following inequality:</p> $\frac{6}{x - 2} > 4$
<p>15. Find the solution to each equation:</p> <p>a. $x^2 + 3x = -1$</p> <p>b. $\frac{6}{x+5} = \frac{x+3}{x+5}$</p>	<p>16. Find the solution(s) for each statement:</p> <p>a. $2 - x \geq 4$</p> <p>b. $2x + 1 = x + 2$</p>
<p>17. Sketch a graph of the piece-wise function to determine if it is continuous at $x = 3$.</p> $g(x) = \begin{cases} 2x - 3, & x < 3 \\ -x + 5, & x \geq 3 \end{cases}$	<p>18. Graph and shade the region that satisfies this system of inequalities:</p> $\begin{cases} x - 3y + 10 > 0 \\ 3x - y + 6 < 0 \end{cases}$
<p>19. Describe the vertices and foci of the ellipse with the following equation:</p> $\frac{(x - 3)^2}{64} + \frac{(y + 2)^2}{25} = 1$	<p>20. Find the domain and range for the function:</p> $g(x) = \frac{1}{2} e^x$

<p>21. Let $f(x) = x^2$ and $g(x) = \sqrt{1-x}$</p> <p>a. Describe the domain and range of each function.</p> <p>b. Form composite functions $f \circ g$ and $g \circ f$.</p> <p>c. Describe the domain and range for each composite function $f \circ g$ and $g \circ f$.</p>	<p>22. Given that $f(x) = 4x + 2$ and $g(x) = \frac{1}{x}$</p> <p>a. Find the average rate of change in the function $f(x)$ between $x = 1$ and $x = 5$.</p> <p>b. Find the average rate of change in the function $g(x)$ between $x = a$ and $x = a + h$</p>
<p>23. Simplify: $\frac{f(x+h)-f(x)}{h}$ where $f(x) = \frac{1}{x+1}$.</p>	<p>24. Simplify: $\frac{f(x+h)-f(x)}{h}$ where $f(x) = x^3 - 1$.</p>
<p>25. Sketch the graphs of each trigonometric transformation of:</p> <p>a. Sketch of $y = \sin\left(\frac{x}{2}\right)$</p> <p>b. Sketch of $y = 2 \cos\left(3x - \frac{\pi}{2}\right) + 1$</p>	<p>26. Sketch the graphs of each function:</p> <p>a. $h(x) = 3x^3 - 8x + 5$</p> <p>b. $f(x) = x^2 - 4x$</p>
<p>27. Accurately graph the function:</p> $h(x) = \frac{x^2 - 2x + 1}{x^2 - 3x + 2}$	<p>28. Make a graph of each function, then write the inverse of the function and show its graph:</p> <p>a. $g(x) = \frac{1}{(x+2)^2}, x \geq -2$</p> <p>b. $h(x) = e^x$</p>
<p>29. Accurately graph the following conics:</p> <p>a. $x^2 + 9y^2 - 4x + 54y + 49 = 0$</p> <p>b. $4y^2 - x^2 - 6x - 8y - 69 = 0$</p>	<p>30. Find the intersection(s) of the pair of functions when $-2\pi \leq x \leq 2\pi$ *BY MAKING A GRAPH*:</p> $\begin{cases} y = 2\sin^2 x \\ y = 1 \end{cases}$

<p>31. Find all solutions (real and complex) to the equation:</p> $12x^3 - 23x^2 - 3x + 2 = 0$	<p>32. Classify each conic. Write the equation in vertex form by completing the square:</p> <p>a. $4x^2 - 9y^2 - 8x - 36y - 68 = 0$</p> <p>b. $9x^2 + 25y^2 - 54x - 200y + 256 = 0$</p>
<p>33. Use synthetic division to divide :</p> $\frac{x^5 - 4x^4 + x^3 - 7x + 1}{x + 2}$	<p>34. Use long division to divide:</p> $\frac{x^5 - x^4 + x^3 + 2x^2 - x + 4}{x^3 + 1}$
<p>35. Solve for x on the interval $0 \leq x \leq 2\pi$</p> <p>a. $\sin x = \frac{\sqrt{3}}{2}$</p> <p>b. $\cos x = -\frac{\sqrt{2}}{2}$</p>	<p>36. Verify each trigonometric identity:</p> <p>a. $\frac{\tan x + \tan y}{1 - \tan x \tan y} = \frac{\sin x \cos y + \cos x \sin y}{\cos x \cos y - \sin x \sin y}$</p> <p>b. $(\sec x - \tan x)^2 = \frac{1 - \sin x}{1 + \sin x}$</p>
<p>37. Solve the trig equation on the interval $0 \leq x < 2\pi$:</p> $3\sin^2 x = \cos^2 x$	<p>38. Solve the trig equation on the interval $-\pi \leq x \leq \pi$:</p> $\cos^2 x - \sin^2 x = \sin x$
<p>39. Find a solution to the system of linear equations:</p> $\begin{cases} 2x + 3y + 16 = 0 \\ 5x - 10y - 30 = 0 \end{cases}$	<p>40. Two cars start moving from the same point. One travels south at 100 kph, the other, west, at 50 kph. How far apart are they in two hours?</p>

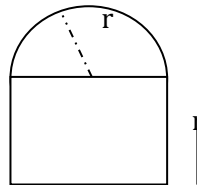
41. A kite is 100 *m* above the ground. If there are 200 *m* of string out, what is the angle between the string and the horizontal (assume that the string is perfectly straight)?

42. A rectangle is inscribed inside the parabola $y = 4 - x^2$, so that one of its vertices is at $(x, 4 - x^2)$.

- a. Represent the area of the rectangle as a function of x .
- b. Describe the domain for this function because the rectangle is inscribed in the parabola.

43. The figure at the right is composed of a rectangle and a semicircle.

- a. Write the formula for the perimeter of the figure.
- b. Write the formula for the area of the figure.

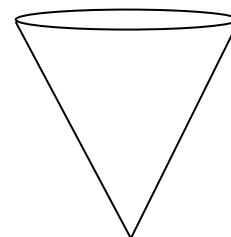


x (years)	0	1	2	3
y (dollars)	\$500.00	\$525.00	\$551.25	\$578.81

44. Use the chart to answer the following questions:

- a. Write a function of the form $y = f(x) = ab^x$ to represent the data for money invested in the bank for three years.
- b. Use the equation to describe the yearly interest received from the bank.
- c. Use the equation to find $f(4)$.
- d. Describe how long it will take to double your money to \$1000.

45. A water tank has the shape of a cone. The tank is 12 *m* high and has a radius of 3 *m* at the top. If the water is 5 *m* deep in the middle, what is the surface area of the top of the water?



NAME: _____

1. _____

2. _____

3. a. _____

4. a. _____

b. _____

b. _____

5. a. _____

6. a. _____

b. _____

b. _____

7. _____

8. _____

9. _____

10. a. _____

b. _____

11. _____

12. _____

13. _____

14. _____

15. a. _____

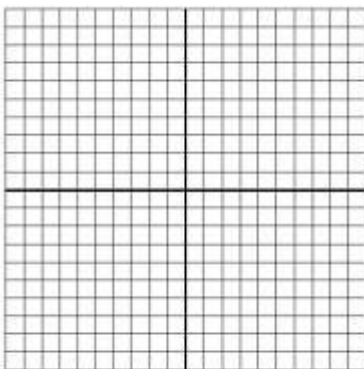
16. a. _____

b. _____

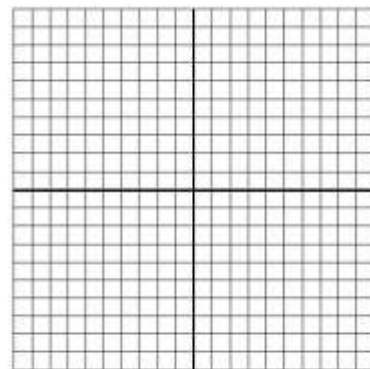
b. _____

17.

18.



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19. _____

20. _____

21. a. _____

22. a. _____

b. _____

b. _____

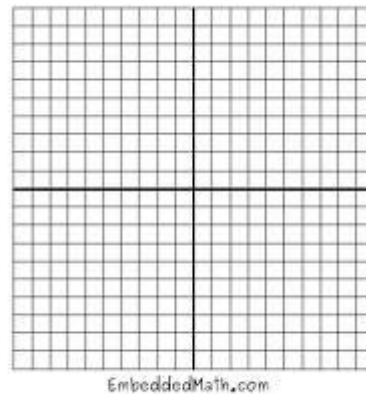
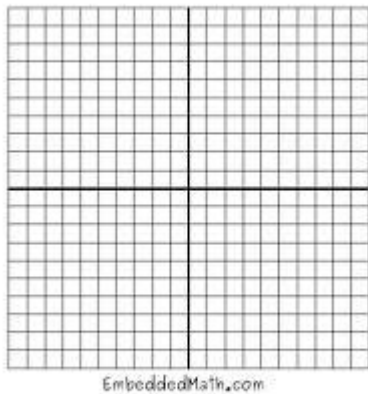
c. _____

23. _____

24. _____

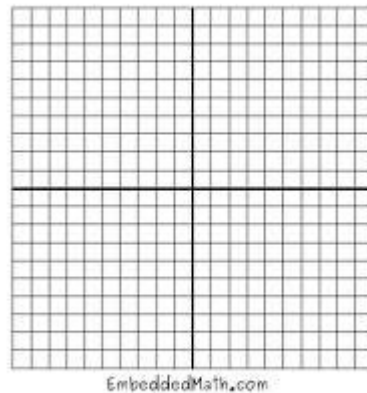
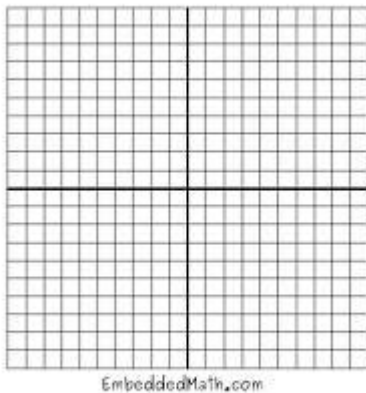
25. a.

26. a.

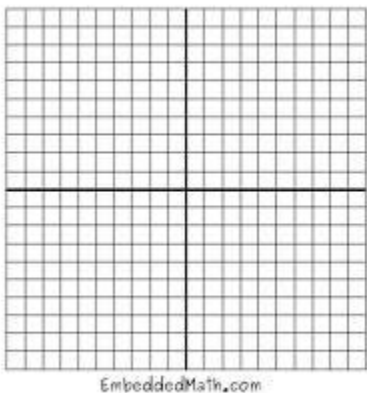


b.

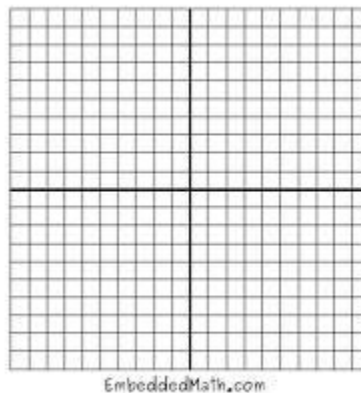
b.



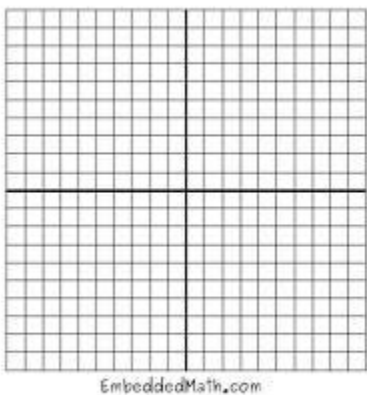
27.



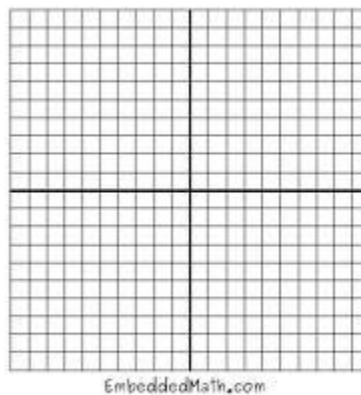
28. a.



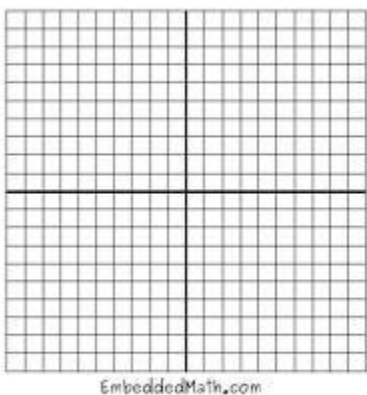
29. a.



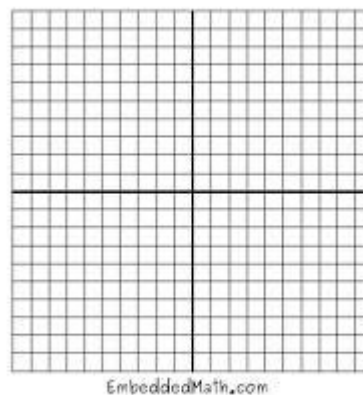
b.



b.



30.



NAME: _____

31. _____

32. a. _____

b. _____

33. _____

34. _____

35. a. _____

36. a. _____

b. _____

b. _____

37. _____

38. _____

39. _____

40. _____

41. _____

42. a. _____

b. _____

43. a. _____

44. a. _____

b. _____

b. _____

c. _____

45. _____

d. _____