Name:_____

Final Review Packet

1) Let $f(x) = 2x^2 - x$ and $g(x) = 3x - 1$. Write an equation for each of the following function operations.

a. $f(g(-2))$ b. $g(f(x))$

2) Simplify each of the following expressions.

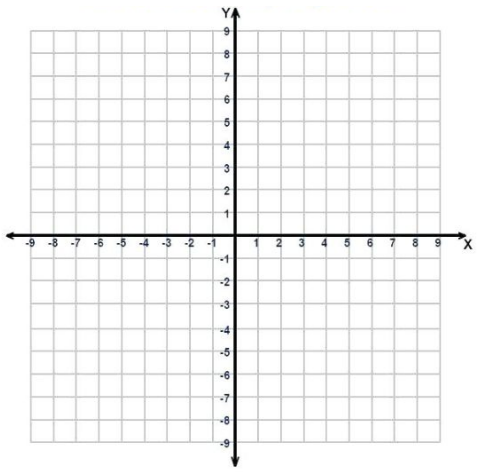
a. $\sqrt{a^2b^5}$ b. $\sqrt[3]{24}$ c. $(25x^4)^{-1/2}$ d. $\left(\frac{2x^{-2}y^3}{x^{-5}y^7}\right)^3$

3) Solve each equation for x.

a. $2y + 3(x + 2) = 6(y - 5)$ b. $kx + 5 = 5x + 2 - k$

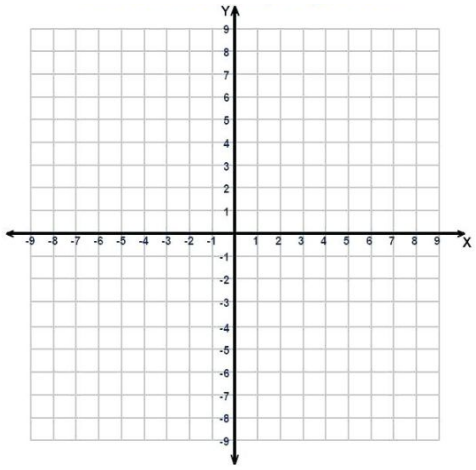
4) Graph the piecewise-defined function at right and determine if the graph is continuous. Explain your reasoning.

$$f(x) = \begin{cases} 2x^2 + 3 & \text{for } x \le 1 \\ 3x + 6 & \text{for } x > 1 \end{cases}$$



5) The parent function $f(x) = \sqrt{x}$ undergoes a series of transformations. The graph is translated left 4 units, stretched vertically by a factor of 3 and translated down 6 units. Write the equation of the transformed parent graph and graph the transformed function.

Equation:

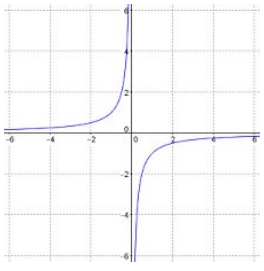


6) Convert each the following angle measures as specified below. Then, in radians, identify another angle that is coterminal with the given angle. Use exact values.

a. 48º to radians b. –500º to radians c. $\frac{13\pi}{12}$ radians to degrees

7) Decide if each of the following functions is even, odd, or neither. Justify your answer.

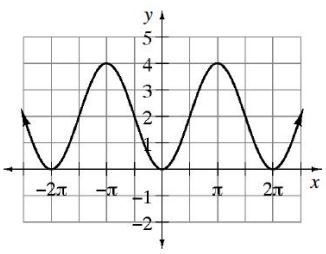
a.f(*x*) = $x^3 + x^2 + 1$ b. *g*(*x*) = $3(x - 4)^2 + 7$ c.



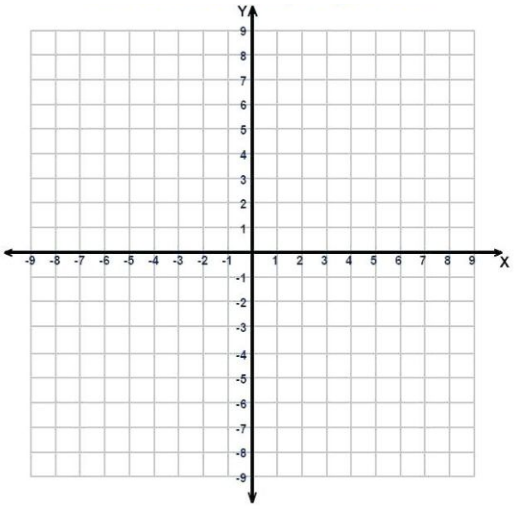
8) Write an equation for the graph below at right in terms of:

Sine:

Cosine:



9) Sketch the graph of $f(x) = 2\sqrt{x-3} + 1$. Then write an equation for $f^{-1}(x)$ and graph $f^{-1}(x)$.



10) Sketch a graph of the unit circle then draw and label the following angles. Then state the sine, cosine, and tangent of each angle.

a. $\frac{\pi}{4}$ b .$-\frac{7\pi}{3}$ c. 3π

11) Algebraically solve each system of equations and name the method you used. Graphically check your answer.

a. $3x^2 + y^2 = 16$
$x^2 - y^2 = 4$

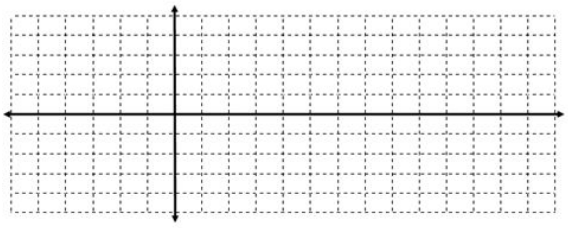
b. $y = 4x + 2$
$3x - \frac{1}{2}y = 1$

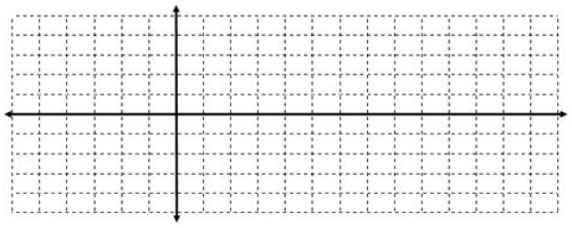
12) Write an equation for the inverse for each of the following functions. Verify your answers using function composition.

a. $f(x) = (x - 3)^3 + 2$ b. $g(x) = \frac{2x-1}{x+1}$

13) Graph at least two cycles of each of the following trigonometric functions and state all the important features.

a. $a(x) = 3\cos(4(x - \frac{\pi}{4})) - 1$ b. $y = -3\cos\left(\frac{\pi}{5}x\right)$





14) Solve each of the following equations for $0 \le x < 2\pi$.

a. $2\cos(x) + 1 = 0$ b. $\sin(x) = \frac{\sqrt{3}}{2}$ c. $\sin^2(x) = \frac{3}{4}$ c. $\tan(x) = -1$

15) Complete the following division problem. Express any remainder as a fraction.

$$\frac{2x^3 + x^2 - 19x + 36}{x + 4}$$

16) Solve for x. Give exact answers.

a. $(3x - 2)^2 + 8(3x - 2) + 12 = 0$

b. $x - 6x^{1/2} + 4 = -5$

17) Simplify each of the following expressions.

a. $(x + y) \div \left(\frac{1}{x} + \frac{1}{y}\right)$

b. $\frac{x}{x+y} - \frac{x-y}{x}$

c. $\frac{3x^{-3}+4x}{2x-x^{-2}}$

18) Determine the partial fraction decomposition for $\frac{5x-4}{(x-2)(x+1)}$.

19) Sketch the function $g(x) = 4 + \sqrt{x-3}$. Then approximate $A(g, 5 \le x \le 8)$ by both using six right endpoint rectangles and six left endpoint rectangles. Write both of the sums using sigma notation.

20) Given: $y = 0.2x(x^2 - 1)(x^2 + x - 12)$. Find all the roots of the polynomial.

21) Write a possible equation for a polynomial function, in factored form with integer coefficients, that has roots at $x = 1 + i$, $x = \sqrt{3}$, and a double root at $x = -4$.

22) Solve.

$x^3 + 1 = x^2 + x$

23) Represent the following expression using summation notation.

$$0.5\sqrt{2} + 0.5\sqrt{2.5} + 0.5\sqrt{3} + \ldots 0.5\sqrt{12}$$