

SHOW YOUR WORK.**PLACE YOUR ANSWERS IN THE BLANKS PROVIDED.****100 points possible**

1. Perform the indicated operation and simplify, if possible. (3 points each)

a)
$$\frac{x^2 - 5x + 6}{x^2 - 4} - \frac{x - 5}{x + 2}$$

Ans _____

b)
$$\frac{\frac{4}{x^2} - \frac{3}{2x}}{1 + \frac{5}{x}}$$

Ans _____

c)
$$\frac{7x + 14}{x^2 - 5x + 6} \div \frac{28}{(x - 3)^2}$$

Ans _____

d)
$$7\sqrt{12x} + \sqrt{50x} - 2\sqrt{27x}$$

Ans _____

2. (2 points) Simplify: $\sqrt[3]{-54x^6y^{10}}$

Ans _____

3. (1point) Write the given expression with rational exponents: $9\sqrt[3]{x^4}$ Ans _____

4. (2 points) Simplify. Write the result with positive exponents: $\frac{(x^{-6}y^8)^{-1/4}}{(x^{-2}y^4)^{3/4}}$ Ans _____

5. (2 points) Write $\frac{8}{3-2i}$ in the form $a+bi$. Ans _____

6. (2 points) Rationalize the denominator. $\frac{\sqrt{6}}{4-\sqrt{2}}$ Ans _____

7. Given $f(x) = \frac{2-x}{x+5}$ and $g(x) = 2x-7$

a) (1point) Find the domain of $f(x)$. Write the answer in interval notation. Ans _____

b) (2 points) Find the composite function, $(f \circ g)(x)$.
Ans _____

c) (2 points) Find the inverse function $g^{-1}(x)$ Ans _____

8. Solve the following equations. Give all real, imaginary, or complex solutions. (3 points each)

a) $\sqrt{2x+11}-3=2$

Ans _____

b) $5x^2-7x=6$

Ans _____

c) $x^2+6x+10=0$

Ans _____

d) $5x^3-10x^2-40x=0$

Ans _____

e) $x^4-14x^2+45=0$

Ans _____

9. (2 point) Write as a single logarithm: $2\log_3 x - 3\log_3 y + 4\log_3 2$

Ans _____

10. Select the correct answer for each problem. (3 points each)

(a) Solve: $\log_3(x + 4) - \log_3x = 2$

Ans _____

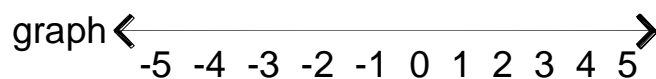
- A. $x = 2$ B. $x = 5$ C. $x = \frac{4}{7}$ D. $x = \frac{1}{2}$ E. $x = \frac{7}{4}$

(b) Solve: $\frac{x+5}{x-2} = \frac{28}{x^2-4} + \frac{5}{x+2}$

Ans _____

- A. $x = 2$ or $x = -4$ B. $x = -4$ C. $x = -2$ or $x = 4$ D. $x = 4$ E. no solution

11. (4 points) Solve the inequality $x^2 - 4 < 3x$. Graph the solution and write in interval form.



Interval notation _____

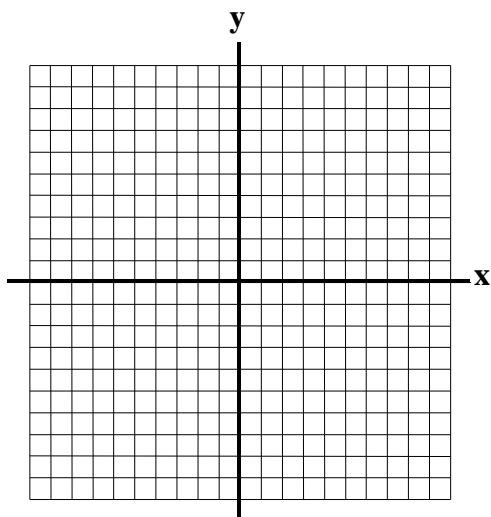
12. (3 points) The stopping distance of a car varies directly with the square of the speed of the car. If a car traveling 60 mph can stop in 200 feet, how many feet will it take the same car to stop when it is traveling 75 mph?

Ans _____

13. (5 points) Find the center and radius of the given circle and sketch its graph: $x^2 + y^2 + 6x - 8y + 21 = 0$

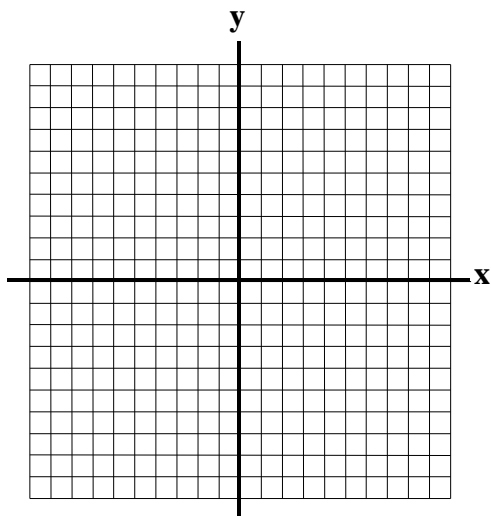
Center _____

Radius _____



14. (5 points) Graph the following function, identifying the vertex and any intercepts. $f(x) = x^2 - 6x + 5$

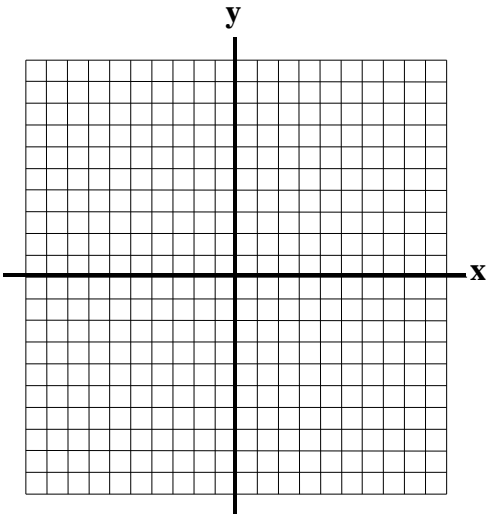
Vertex: _____ x-intercept(s): _____ y-intercept(s): _____



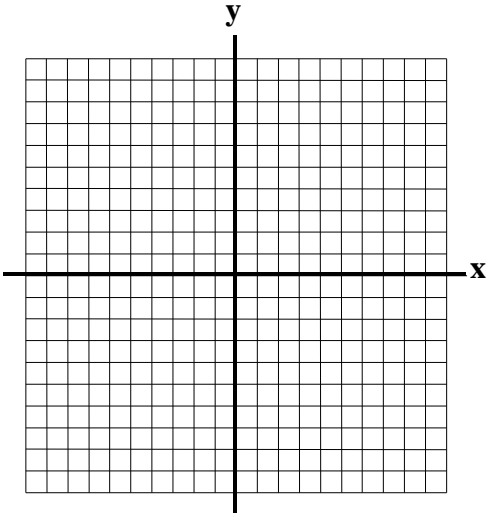
15. (2 point) Write $\log_5 0.04 = -2$ as an exponential equation.

Ans _____

16. (3 points) Graph the following equation. $16x^2 + 36y^2 = 144$



17. (3 points) Graph the following equation: $f(x) = 3^x - 7$



18. (3 points) How long will it take an investment of \$800 to reach \$1200 if it is invested at a 1.6% annual percentage rate, compounded continuously? Use $A = Pe^{rt}$ and round to one decimal place.

Ans _____

19. (4 points) Leslie walked 4 miles in the same amount of time that Sandra rode her bike 9.6 miles. If Sandra's average biking speed was 7 mph faster than Leslie's average walking speed, find each average speed.

Leslie's _____
Sandra's _____

20. (4 points) Tom can build a raft in 8 hours. Huck can build a raft in 6 hours. How long would it take Tom and Huck to build a raft if they work together?

Ans _____

21. (2 points each) Solve the following equations. Give the exact answer and an approximation accurate to three decimal places.

a) $e^{0.7x} = 20$

Exact _____
Approximation _____

b) $\log(x + 5) = 0.6$

Exact _____
Approximation _____

22. (3 points) A ladder that is 30 feet long is leaning against a tall building. The foot of the ladder is 8 feet from the base of the building. How far up the wall does the ladder reach? (Assume that the ground and building meet at a right angle under the ladder.) Give an exact answer (in feet) and an approximation that is accurate to two decimal places.

Exact _____
Approximation _____

23. Solve the following systems of equations. (4 points each)

a) $x - y = 1$
 $x^2 + y^2 = 25$

Ans _____

b) $x + y - z = 3$
 $4x + 3y - 2z = 19$
 $2x - y - 5z = 9$

Ans _____