Fall 2008 Math 52 FINAL EXAM NAME: _____

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

1. Perform each of the following operations and simplify, if possible. (3 points each)

a) $\dfrac{x-8}{x^2-5x-24}\cdot\dfrac{x^2-9}{x+2}$

Ans _____

b) $\dfrac{5x}{(x-2)^2}-\dfrac{3}{x-2}$

Ans _____

c) $\dfrac{x^{-1}+2x^{-2}}{2x^{-1}+(2x)^{-1}}$

Ans _____

2. (3 points) Change the radicals to expressions with rational exponents, simplify, then write the result as a single radical. (Assume that the variable represents positive real numbers.)

$$\frac{\sqrt[3]{x^5}\cdot\sqrt[6]{x}}{\sqrt{x}}$$

Ans _____

3. Perform the following operations and simplify, if possible. (2 points each)

a) $\sqrt[3]{6x^2y^5} \cdot \sqrt[3]{4xy^2}$ Ans _____

b) $\frac{2x\sqrt{7}}{5} + \sqrt{\frac{7x^2}{100}}$ (Assume the variable represents nonnegative real numbers.) Ans _____

4. (3 points) Write the quotient $\frac{4-3i}{3+i}$ in the form $a + bi$. Ans _____

5. (2 points) If $f(x) = -3x + 5$ and $g(x) = x^2 + x - 2$ find the function composition $(f \circ g)(x)$.

Ans _____

6. (2 points) Identify the domain of the function $f(x) = \sqrt{x-2}$. Write it in interval notation.

Ans _____

7. (2 points) Solve the equation. $\sqrt{3x+3} - 4 = 8$

Ans _____

8. Solve the following equations. (4 points each)

a) $3+\frac{5}{2y}=\frac{y}{2}-\frac{1}{y}$ Ans _____

b) $2x^2+12x+3=0$ Ans _____

c) $\frac{1}{2}x^2-x+\frac{5}{6}=0$ Ans _____

d) $2x^{2/3}-5x^{1/3}-3=0$ Ans _____

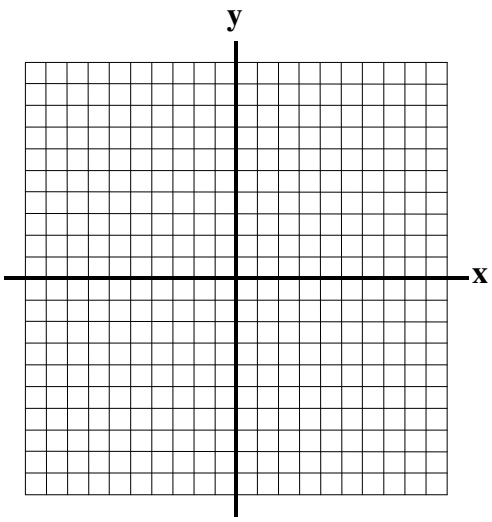
9. (4 points) Solve the following inequality. Graph the solution set and write it in interval notation.

$(x+6)(x+2) \geq 0$

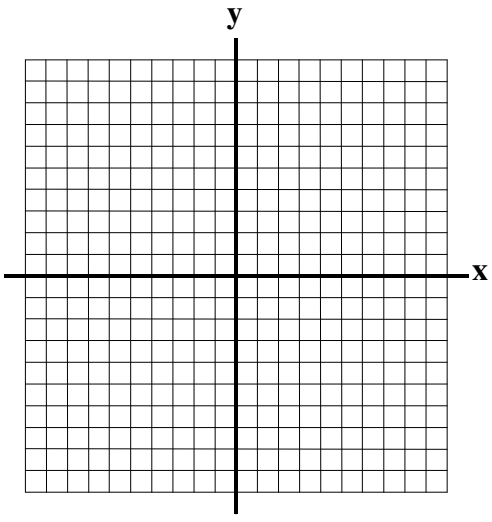
Graph:

Interval notation _____

10. (4 points) Graph the following function. Label the vertex and any intercepts. $f(x) = x^2 - 6x + 10$



11. (4 points) Graph the following equation. Label the vertex and any intercepts. $x = y^2 + 4y - 5$



12. A stone is thrown upward from the ground. The height in feet above the ground after *t* seconds is given by the function $h(t) = -16t^2 + 56t$.

a) (2 points) Find the maximum height of the stone.

Ans _____

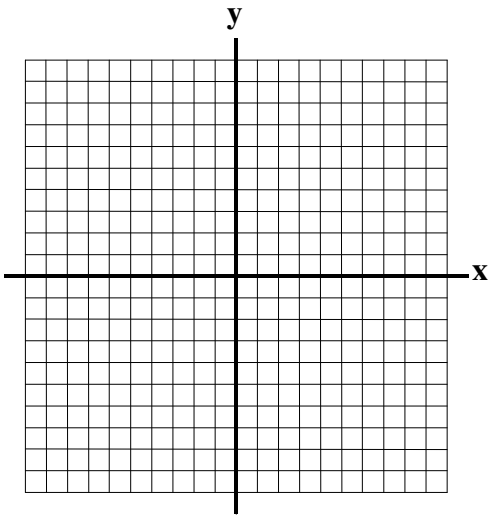
b) (1 point) Find the time it takes for the stone to hit the ground.

Ans _____

13. (2 points) For the one-to-one function $g(x) = \frac{1}{3}x + 4$, find the inverse function $g^{-1}(x)$

Ans_____

14. (4 points) Graph the following function. Label at least 4 points. $f(x) = 3^{x+2}$



15. (2 points) Show how to use the change of base formula to approximate $\log_4 0.2$ to four decimal places.

Ans _____

16. Evaluate the following. (1 point each)

a) $\log_5 \sqrt[4]{5}$. Ans _____

b) $16^{-3/2}$ Ans _____

c) $\log_a a + \log_b b^3$ Ans _____

17. (3 points) Solve the equation. $\log(3x-2) = -0.8$ (Give the exact answer and an approximation accurate to four decimal places.)

Exact _____

Approximation_____

18. (4 points) Solve the equation. $\log_8 x + \log_8 (x-2) = 1$

Ans _____

19. (4 points) A rat population grows at the rate of 8% monthly. If there are 200 rats in January, find how many months it will take for the population to reach 600 rats. Use $y = y_0 e^{0.08t}$ and round your answer to the nearest tenth.

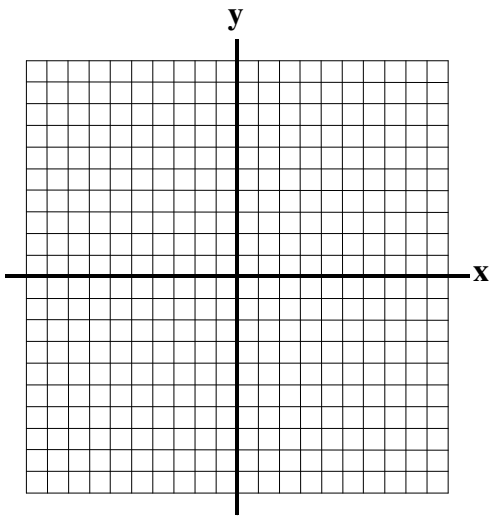
Ans _____

20. (3 points) Find the center and radius of the circle with equation $x^2 + y^2 + 16x + 6y + 37 = 0$

Center _____

Radius _____

21. (4 points) Graph the following equation. $9y^2 - 4x^2 = 36$



22. (4 points) *For the following problem, define a variable, use the variable in an equation, solve the equation and write a sentence stating your result.*
A boat can travel 30 miles upstream in the same amount of time it takes to travel 40 miles downstream. The speed of the current is 4 miles per hour. Find the speed of the boat in still water.

Define variable:

Equation:

Sentence stating the result:

23. (3 points) According to the universal gas law the volume of a gas varies directly with the temperature and inversely with the pressure. If the volume of a gas is 1.75 cubic meters when the temperature is 70 Kelvin and the pressure is 20 grams per square centimeter, find the volume when the temperature is 100 Kelvin and the pressure is 40 grams per square centimeter.

Ans _____

24. (4 points) Solve the following system of equations.

$$4x^2 + y^2 = 72$$
$$2x + y = 0$$

Ans _____

25. (4 points) Solve the following system of equations.

$$\begin{aligned} 4x + y - 2z &= 1 \\ -3x - 2y &= -9 \\ x + 3y + 4z &= 19 \end{aligned}$$

Ans _____