MAT 099 Final Test
200 Points Name_____

1. Simplify each of the following without a calculator:

   a. (5 pts) $\sqrt{78750}$

   b. (5 pts) $\sqrt{\dfrac{294x^2y^{-3}}{x^5z^{-5}}}$

   c. (5 pts) $\sqrt{x^2}$

   d. (5 pts) $\sqrt{(x+5)^2}$

2. (5 pts) Simplify $16^{1/4}$

3. Solve $x^2+2x-8=0$ with three methods:

   a. (5 pts) Factoring

   b. (5 pts) Completing the Square

#3 continued... Solve $x^2 + 2x - 8 = 0$ by ...

c. (5 pts) Quadratic Formula

4. (10 pts) What is the discriminant for the equation $x^2 + 2x - 8 = 0$, and what does it tell you?

5. (10 pts) Solve $x^2 - 3x + 5$ by any method. Non-real solutions (with an i in them) are permitted. In fact, they're necessary. Can you see why? (Hint: What's the discriminant tell you?)

6. (10 pts) What is the domain of $h(x) = \dfrac{15x+11}{x^2+2x-8}$? (Previous work should help, here.)

7. Perform the indicated operations:

   a. (10 pts) $\dfrac{x+4}{x-3} - \dfrac{x-4}{x+2}$

   b. (10 pts) $\dfrac{x-3}{x^2+2x-8} + \dfrac{x+2}{x^2-5x+6}$

8. (10 pts) Simplify $\dfrac{x^{-3}+y^{-1}}{x^{-2}}$

9. Solve:

a. (5 pts) $|2x+3|>6$

b. (5 pts) $|2x+3|<6$

10. (10 pts) Divide synthetically: $\dfrac{3x^3+7x^2-4x+12}{x-2}$.

11. Interpret your answer to the previous question by expressing it in two ways:

a. (5 pts) $Dividend = Divisor \cdot Quotient + Remainder$

b. (5 pts) $\dfrac{Dividend}{Divisor} = Quotient + \dfrac{Remainder}{Divisor}$

12. (5 pts) Given $P(x) = 3x^3 + 7x^2 - 4x + 12$. Use the Remainder Theorem to determine $P(2)$. Hint: Your previous work *should* come in handy, here. If you need more room, you're doing it wrong.

13. (10 pts) An experienced painter can paint a room in 5 hours. A beginner needs 7 hours to complete the same job. How long does it take for the two to do the job together?

14. (10 pts) Simplify $\dfrac{\left(2^3 x^{-1} y^5\right)^2}{\left(6^{-2} x^2 y^{-1}\right)^{-2}}$ and write the final result using positive exponents

15. (5 pts) Evaluate $\dfrac{2.3\times 10^3}{3.6\times 10^{-6}}$. Express final answer in scientific notation.

16. (10 pts) A Chemist has an unlimited supply of both 11% and 30% nitric acid solutions. He wants 100 liters of 21% nitric acid. How much of the 11% and 30% solutions should he mix together to accomplish this?

17. (10 pts) Solve the following system of linear equations by the **addition** method.

$$x + y = 5$$
$$3x - 4y = 6$$

18. (5 pts) Find an equation of the line through (1,1) and (4,3) in **point-slope form**.

19. (5 pts) Re-write your answer to the previous in **slope-intercept form**.

20. (5 pts) Re-write your answer to the previous in **function notation.**

21. (5 pts) Re-write your answer to the previous in **standard form**.