MAT 121   Test 1
100 Points   Name_____

1. Simplify the radicals. Assume all variables represent positive real numbers.

   a. (10 pts) $\dfrac{\sqrt{27x^{13}}}{\sqrt{y^6}}$ b. (10 pts) $\dfrac{\sqrt[3]{27x^{13}}}{\sqrt[3]{y^6}}$

2. (20 pts) Solve $|2x - 4| < 7$. Give your answer in both set-builder and interval notation.

3. (10 pts) Simplify $\sqrt{169344}$. I'm looking for an answer involving radicals. You may use your calculator to help break it down, but a decimal approximation will earn a ZERO.

4. Solve $x^2 - 4x - 12 = 0$ in 3 ways:

   a. (10 pts) Quadratic formula

   b. (10 pts) Factoring

   c. (10 pts) Completing the Square

5. Find the least common denominator and *use* it to perform the indicated addition:

     a. (10 pts) $\dfrac{11}{30} + \dfrac{47}{108}$

     b. (10 pts) $\dfrac{x-1}{(x+1)(x-3)} + \dfrac{2x+3}{(x-3)(x-2)}$

6. (10 pts) Simplify $\dfrac{2+3i}{2-3i}$. Write your final answer in the form $a + bi$.

7. (10 pts) Find an equation of the line through (-5, -3) and (-1, 5). Point-slope form is preferred.

8. (10 pts) Graph the line $3x - 7y = 13$. Show intercepts.

9. (20 pts) It takes Ginette 5 hours to finish a job that Steve can do in 8 hours. How many hours will Ginette spend on the job if Steve joins her 1 hour after she starts alone and they work together until it's done?

10. (20 pts) Graph the system of inequalities:
$$2x + 3y \leq 12$$
$$x - y \leq 4$$
$$x \geq 0$$
$$y \geq 0$$

11. (10 pts) Sketch the graph of $g(x) = (x - 4)^2 + 5$ by transforming the graph of the basic function $f(x) = x^2$. I'm really interested in tracking where the points (-1, 1), (0, 0) and (1, 1) in the graph of f are shifted to at each stage of the transformation, and especially where they eventually end up.

12. If $P(x) = x^2 - 3x + 7$, what is $P(2)$?

13. Divide synthetically. Use your work to write the final answer in the form
Dividend = *Divisor* • *Quotient* + *Remainder*

$$\frac{3x^3 - 2x^2 + 5x - 11}{x + 3}$$