MAT 121   Test 1, Spring, 2019   Name_____

100 Points   Covers Chapter 1

Do all work and **put all your work and (circled) answers** on the white paper provided. Do not write on the backs of the white pages. Leave a margin at the top left corner on every page. A BIG "121" works really well for the top left corner of every page. Show only ONE COLUMN of work. Make sure your work is in proper order before turning in the stack.

Leave room between problems. Do not squeeze work in to fit a page. Start a fresh page. When in doubt on how long a problem will turn out to be, start a fresh page. THE ONLY WRITING ON THIS SHEET SHOULD BE YOUR NAME.

Find all real or imaginary solutions, #s 1 – 4.

1. (10 pts) $3x - 2 = 5x + 7$ (Give your answer as an improper fraction.)

2. (5 pts) $\dfrac{1}{6}x + \dfrac{7}{4} = \dfrac{4}{15}x - \dfrac{2}{3}$ (Give your answer as an improper fraction.)

3. (5 pts) $11x^2 = 9$ (Give your answer in simplified radical form.)

4. (5 pts) $5x^2 - 3x + 6 = 0$ (Give your answer in simplified radical form.)

#s 5 – 7. Compute the discriminant for the following equations. Tell me what it says about the solutions of the equations, *without solving the equations*. How many distinct solutions, how many real zeros. If you can predict rational solutions, that's worth some extra points.

5. (5 pts) $11x^2 = 9$

6. (5 pts) $5x^2 - 3x + 6 = 0$

7. (5 pts) $84x^2 - 37x - 30 = 0$

Solve by factoring: You can use a "cheat," so long as you show understanding of the connection between solutions and factors.

8. (10 pts) $x^2 + 3x - 180 = 0$

9. (5 pts) $84x^2 - 37x - 30 = 0$

Solve #s 10 and 11 by completing the square. Leave all answers in (*exact*) simplified radical form.

10. (5 pts) $x^2 - 6x - 11 = 0$

11. (5 pts) $3x^2 + 5x - 10 = 0$

Now for lines:

12. Find an equation in point-slope form through the point $(3, -5)$ of the line that is…

    a. (5 pts) … parallel to $y = \dfrac{5}{7}x - 1,256.4827$

    b. (5 pts) … perpendicular to $y = \dfrac{5}{7}x - 1,256.4827$

13. Sketch the graphs of the two lines on the same set of axes:
    a. (5 pts) $x = 5$
    b. (5 pts) $y = -8$

14. (5 pts) Sketch the graph of $3x - 2y = 6$. I'll know if you've been paying attention by the features you include and the features you don't waste our time on.

15. Solve the absolute value inequalities. Give answers in set-builder, line-graph and interval notation.

    a. (10 pts) $|3x - 7| \le 8$

    b. (5 pts) $|3x - 7| \ge 8$

    c. (5 pts) $|7x + 3| + 7 > 6$

    d. (5 pts) $|7x + 3| - 7 < 6$

16. (5 pts) SET UP THE FOLLOWING WORD PROBLEM. Do not solve.
How much 30% alcohol solution must be added to 100 liters of 83% alcohol to obtain a mixture that is 50% alcohol?

17. (5 pts) SET UP THE FOLLOWING WORD PROBLEM. Do not solve.
John can mow St. Joachim's Cemetery in 10 hours. Tracy can mow it in 12 hours. How long does it take them to mow the cemetery, if they work together?

BONUS SECTION: Work any 3 bonus questions for up to 15 bonus points.

1. (5 pts) Finish answering the question in #17 about John and Tracy. I want a worked *solution*, here. Leave your final answer(s) as a fraction.

2. (5 pts) Suppose John shows up 2 hours late to work, then joins Tracy, and they finish working, together.   How many hours does each of them end up working?

3. (5 pts) Sketch the graph of $y = -3x + 7$. I expect to see *x*- and *y*-intercepts.

4. (5 pts) Re-write the function $x^2 - 6x - 11 = 0$ in the form $f(x) = a(x - h)^2 + k$.

5. (5 pts) Find all real *and* nonreal solutions to the equation $x^4 - 16 = 0$. (Leave answer in simplified radical form.)