Math 105 - Solving Polynomial Equations   **Name:** _____

Find all solutions to the following equations.

1. $x^2 - 5x + 4 = 0$

2. $x^2 - 4x + 4 = 0$

3. $x^2 - x = 6$

4. $x^2 + 35 = 12x$

5. $4x^2(x - 1) - 12x(x - 1) = 0$

6. $y^2(y^2 - 5) - 4(y^2 - 5) = 0$

7. $5x^2 - 5x = 150$

8. $\dfrac{3x^2 - 10x + 9}{x^2} = 2$

9. $x^3 + x^2 - 6x = 0$

10. $\dfrac{10}{x} = x - 7$

Sometimes it helps to factor first, before trying to solve. Try that on the next two.

11. $12z^2 + 10z = 18z + 15$

12. $\dfrac{x^2 - 2x - 3}{x + 1} + \dfrac{x^2 + 5x - 24}{x - 3} = 13$

13. Sketch a graph of the polynomial function $y = x^2 - 2x$. Be sure to label the graph and clearly indicate the locations of all roots and vertices of the curve.

14. Sketch a graph of the polynomial function $y = x^2 - 5x + 6$. Be sure to label the graph and clearly indicate the locations of all roots and vertices of the curve.

15. A rectangular farm is 2 miles longer than it is wide. The area of the farm is 50 square miles. Write down a polynomial equation expressing this information using the letter w to represent the width of the farm. You don't need to solve the equation.

16. A snow cone shop estimates they will sell $Q(p) = 400 - 100p$ snow cones per day if they set the price of a snow cone at p dollars. Make a graph of the revenue function $R(p) = p\,Q(p)$. How much should the shop charge for a snow cone if they want to maximize their revenue?

17. A rectangular courtyard is 30 meters long and 20 meters wide. Along the edge of the courtyard is a paved walkway that is x meters wide. The area inside the walkway is a rectangular garden that is 200 square meters. How wide is the walkway?
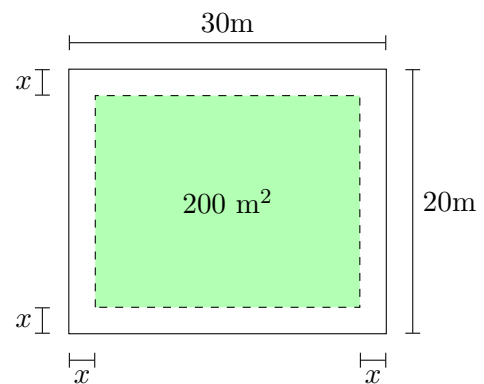
18. The set of points that satisfy the equation $x^2 + y^2 = 25$ is a circle with radius 5. Find the two points where the line $y = -7x + 25$ intersects that circle. Hint: *to solve this, substitute one equation into the other.*