Math 95, HW 6 5.6/5.7 Factoring and Solving Quadratic Equations Review

Name: _____

Section 5.6

Concepts and Vocabulary:

1. When factoring a polynomial, what should you always do first?

3. Can you factor $x^2 + 4$? Explain.

4. What method might you use to factor a polynomial with four terms?

Practice Exercises:

In exercises 5 - 57, factor completely, if possible.

5. $a^2 - a$

7. $a^2 - 9$

9. $x^2 - 2x + 1$

11. $x^3 - a^3$

13. $a^2 + 4$

15. $x(x + 2) - 3(x + 2)$

19. $6x^2 - 14x$

23. $4a^4 - 64$

27. $2x^4 - 5x^3 - 25x^2$

31. $x^3 + 3x^2 + x + 3$

35. $ax + bx - ay - by$

39. $-4x^3 + 24x^2 - 36x$

43. $-x^4 - 8x$

47. $r^4 - 16$

51. $2x^4 - 2y^4$

55. $(z - 2)^2 - 9$

Supplemental Problems:

S1. Factor the following quadratic functions completely, if possible.

a. $f(x) = 2x^2 + 5x - 3$

b. $g(x) = 6x^2 + 13x + 6$

c. $h(x) = 3x^2 - 19x + 20$

d. $k(x) = 12x^3 + 12x^2 - 45x$

S2. Suppose $f(x) = 4x^2 + 8x - 5$.

a. Determine $f(3)$

b. Rewrite $f(x)$ in factored form.

c. Determine $f(3)$ again using the factored form you found in part (b).

d. Supposing you got the same answer in parts (a) and (c), does this necessarily imply that you factored $f(x)$ correctly?

Solutions to 5.6 Supplemental Problems:

S1a. $f(x) = (2x - 1)(x + 3)$

S1b. $g(x) = (3x + 2)(2x + 3)$

S1c. $h(x) = (x - 5)(3x - 4)$

S1d. $k(x) = 3x(2x + 5)(2x - 3)$

S2a. $f(3) = 55$

S2b. $f(x) = (2x - 1)(2x + 5)$

S2c. $f(3) = (2(3) - 1)(2(3) + 5) =$
$(6 - 1)(6 + 5) = 5 \cdot 11 = 55$

S2d. No. To say that
$4x^2 + 8x - 5 = (2x - 1)(2x + 5)$ is to indicate that the two expressions have the same output for every value of x while we have only shown that they have the same output when you input 3 into each.

Section 5.7

Concepts and Vocabulary:

4. To solve $x^2 - 3x - 3 = 1$, could you start by factoring the left side of the equation? Explain.

6. Does the equation $x^2 + 4 = 0$ have any real number solutions? Explain.

Solving Quadratic Equations:

In exercises 13 - 33, solve the given quadratic equation by factoring, if possible. Write the solutions in set notation.

13. $z^2 - 64 = 0$

15. $4y^2 - 1 = 0$

17. $x^2 - 3x - 4 = 0$

19. $x^2 + 4x - 12 = 0$

21. $2x^2 + 5x - 3 = 0$

23. $2x^2 = 32$

25. $z^2 + 14z + 49 = 0$

29. $15n^2 = 7n + 2$

27. $9t^2 + 1 = 6t$

31. $x^2 + 12 = 0$

Higher Degree Equations:

In exercises 43 - 49, solve the equation by factoring. Write your answers in set notation.

43. $z^3 = 9z$

47. $2x^3 - 6x^2 = 20x$

45. $x^3 + x = 0$

49. $t^4 - 4t^3 - 5t^2 = 0$

Supplemental Problems:

S1. Suppose f, g, and h are defined as shown below. Solve the given equations. State your conclusion using set notation.

$$f(x) = x^2 - x - 6 \qquad g(x) = 2x^2 + 5x - 3 \qquad h(x) = 12x^3 + 12x^2 - 75x$$

a. $f(x) = 0$

c. $h(x) = 0$

b. $g(x) = 4$

d. $f(x) = g(x) + 2$

S2. The height of a baseball, in feet, after being struck by a bat is given by

$$h(t) = -16t^2 + 47t + 3.$$

How many seconds will it take for the ball to hit the ground after being struck?

Solutions to Supplemental Problems:

S1a. The set of solutions is $\{-2, 3\}$.

S1b. The set of solutions is $\left\{-\frac{7}{2}, 1\right\}$

S1c. The set of solutions is $\left\{-\frac{5}{2}, \frac{3}{2}\right\}$

S1d. The set of solutions is $\{-5, -1\}$.

S2. The ball will hit the ground 3 seconds after being struck.