Math 095 Exam #3 Key (Fall 2010)

1a. $\left(p - \frac{1}{2}\right)\left(p + \frac{1}{2}\right)$

1b. $(2x - 3)(2x + 3)$

1c. $(x^2 + 1)(x - 1)(x + 1)$

2a. $m^2 = 4 + 3m \Rightarrow m^2 - 3m - 4 = 0 \Rightarrow (m - 4)(m + 1) = 0 \Rightarrow m = -1, 4$

2b. $9t^2 + 12t + 4 = 0 \Rightarrow (3t + 2)(3t + 2) = 0 \Rightarrow t = -\frac{2}{3}$

2c. $x^2 - 7x = 0 \Rightarrow x(x - 7) = 0 \Rightarrow x = 0, 7$

3. Let x be the length of the shorter leg. Then the lengths of the sides of the triangle are x, $x + 1$, and $2x - 1$. By the Pythagorean Theorem $x^2 + (x + 1)^2 = (2x - 1)^2$, which becomes $2x^2 - 6x = 0$. This equation has solutions $x = 0$ & 3, so the length of the shorter leg must be 3 m.

4a. $\dfrac{8(z - 3)}{4(z - 3)} = \dfrac{8}{4} = 2$

4b. $\dfrac{6y(y - 1)}{2(y - 1)} = \dfrac{6y}{2} = 3y$

5a. $\dfrac{2}{y - 2}$

5b. $\dfrac{14q^2}{9}$

5c. We obtain $\dfrac{(2w + 1)(w - 1)}{(2w + 3)(w + 1)} \cdot \dfrac{(2w + 3)(w - 1)}{(2w - 1)(2w + 1)}$, which simplifies as $\dfrac{(w - 1)^2}{(w + 1)(2w - 1)}$.

6a. $\dfrac{x - 2}{x + 2}$

6b. $\dfrac{12}{20x} + \dfrac{45}{20x} = \dfrac{57}{20x}$

6c. $\dfrac{3x + 2(x - 4)}{x(x - 4)} = \dfrac{5x - 8}{x(x - 4)}$

7a. $5t + 4t = 36 \Rightarrow t = 4$

7b. $3(2z + 1) = 7z + 5 \Rightarrow z = -2$

7c. Multiplying by 10 yields $2(8p) = 5(3p - 4) + 5(5)$, whence we get $p = 5$

8. $\dfrac{22.74}{6} = \dfrac{x}{15} \Rightarrow x = \dfrac{15(22.74)}{6} = \$56.85$

9. Let x be the population of fish in the lake. Then we get $\dfrac{x}{840} = \dfrac{1000}{18} \Rightarrow x = \dfrac{840,000}{18} \Rightarrow x \approx 46,700$.