Group #: _____ Name: _____

1. (24 points) Factor the following **expressions** completely. (Notice that there is no "=" sign, that's why they are called 'expressions' instead of 'equations'. We often associate 'equation' with 'solving' to get the value for the unknown and associate 'expression' with 'factoring' to simplify.)

   (a) (5 points) $12x^2 - x - 6$

   (b) (5 points) $10x^2 - 10x - 120$

   (c) (5 points) $\dfrac{2^3 \cdot 3^3 - 2^4 \cdot 3^4}{6^2}$ (Do not use a calculator for this problem)

   (d) (9 points) $\dfrac{42(x+3)^7(x-6)^5 - 50(x-6)^6(x+3)^6}{(x-6)^5}$ (Be sure to simplify completely)

2. (8 points each) Simplify the following expressions.

   (a) $\dfrac{3x^3 - 16x^2 - 35x}{3x^2 - 26x + 35}$

   (b) $\dfrac{x^2 - x - 42}{x^2 + 6x} \cdot \dfrac{x^3 + x^2}{x^2 - 6x - 7}$

   (c) $\dfrac{\frac{x^3}{x+4}}{\frac{x}{x^2+8x+16}}$

   (d) $\dfrac{x}{x-6} - \dfrac{1}{x+5}$

   (e) $\dfrac{2}{x^2} + \dfrac{3}{x^2+7x}$

   (f) $\dfrac{\frac{x+4}{x-1} - \frac{x-3}{x-4}}{x+4}$

   (g) $\dfrac{\frac{1}{8+x+h} - \frac{1}{8+x}}{h}$

3. (10 points each) Find all real solutions of the following equations. If there is no solution, say so.

   (a) $\dfrac{1}{3-t} + \dfrac{5}{3+6} + \dfrac{18}{9-t^2} = 0$

   (b) $\dfrac{x}{8x-64} - 8 = \dfrac{1}{x-8}$