Math 105 - Midterm Review Problems **Name:** _____

Simplify each of the following expressions to a single reduced fraction. Show your work. No calculators.

1. $\dfrac{12x}{x^2 + x^2 + x^2}$

2. $\dfrac{1}{x-1} - \dfrac{3}{x+1}$

3. $\dfrac{x^2 + x - 12}{x^2 + 5x + 4}$

4. $\dfrac{3x+6}{\frac{x}{4} + \frac{1}{2}}$

Simplify the following expressions by factoring.

5. $\dfrac{3ab^2 + 6abc}{2b}$

6. $p(6000 - 400p) - 2(6000 - 400p)$

Simplify the following expressions by expanding.

7. $p(6000 - 400p) - 2(6000 - 400p)$

8. $5 - 3(x - (2x - 1))$

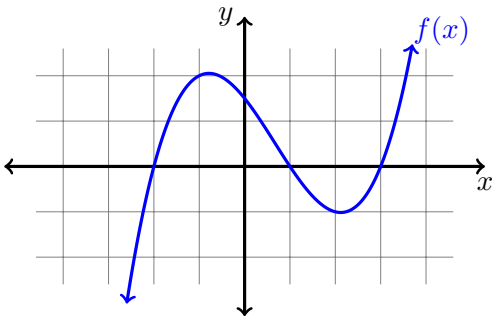
Solve the following equations for x.

9. $12x^2 = 7x - 1$

10. $\dfrac{x(x-3)(x+5)}{(x-2)^2} = 0$

More $\longrightarrow$

11. Use the graph below to find the values of x for which $f(x) < 0$.



12. Based on the graph above, what are $f(-1)$ and $f(2)$ and $f(3)$?

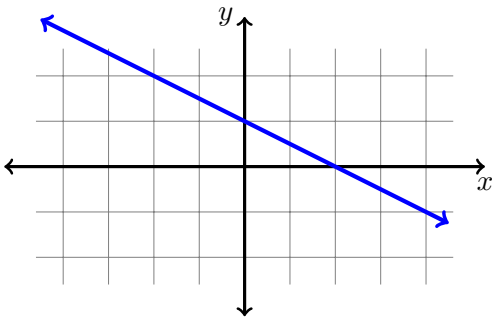
13. A small business sells cupcakes. The quantity Q of cupcakes demanded by customers depends on how high the business decides to set the price p of a cupcake according to the function:

$$Q(p) = 1800 - 50p^2.$$

Find a formula for the inverse function and explain what it computes.

14. Let $f(x) = x^2 - 1$ and let $g(y) = \frac{1}{4}y$. Evaluate the following: $f(g(4))$ and $g(f(3))$.

15. Find a formula for the linear function shown below.



16. Bob has an SUV that gets 20 miles per gallon and a hybrid car that gets 40 miles per gallon of gas. He drives 400 miles per week on average. If he drives x of those miles in the SUV and the rest in the hybrid, then how many gallons of gas will he use? Your answer should be a function of x.