Math 105 - Midterm Review Problem Solutions

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

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

$\dfrac{4}{x}$

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

$\dfrac{-2(x-2)}{(x-1)(x+1)}$

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

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

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

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Simplify the following expressions by factoring.

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

$\dfrac{3a(b+2c)}{2}$

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

$400(p-2)(15-p)$

Simplify the following expressions by expanding.

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

$-400p^2+6800p-12000$

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

$3x+2$

Solve the following equations for x.

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

$x=\frac{1}{3},\frac{1}{4}$

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

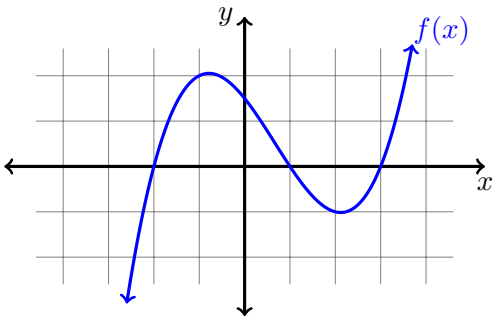
$x=0,3,-5$

More $\longrightarrow$

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

$x < -2$ or $1 < x < 3$

or using interval notation:
$(-\infty, -2)$ and $(1, 3)$



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

$f(-1) = 2, \quad f(2) = -1, \quad f(3) = 0$

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.

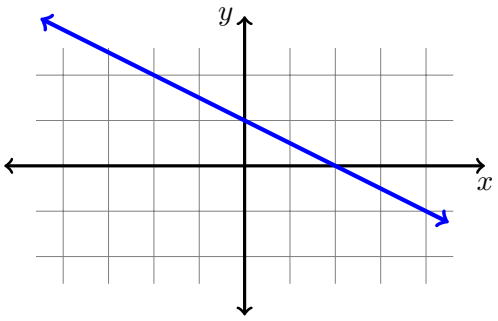
$p = \sqrt{\dfrac{1800 - Q}{50}}$ computes the price they should pick to sell a given quantity.

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

$f(g(4)) = 0 \quad g(f(3)) = 2$

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

$y = -\frac{1}{2}x + 1$



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.

$\dfrac{x}{20} + \dfrac{400 - x}{40}$ which can be simplified to: $\frac{1}{40}x + 10$, if you want.