1. Perform the indicated operations and simplify.

(a). $\dfrac{3x+9}{x^2-9} \cdot \dfrac{x^2-6x+9}{9}$

(b). $\dfrac{x^2-4x+3}{1-x^2} \div (x^2+x-12)$

(c). $\dfrac{1-2a}{4a} - \dfrac{a+1}{4a}$

(d). $\dfrac{4}{3} + \dfrac{2x+1}{4}$

(e). $\dfrac{x}{x+2} - \dfrac{x+2}{x^2-4} + 3$

(f). $\dfrac{3a^2bc^4}{8a^3b^2c^5} \div \dfrac{2abc}{a^2b^3c^2}$

2. Simplify the complex fractions

(a). $\dfrac{\dfrac{3}{2y}+2}{\dfrac{2}{3y}+\dfrac{1}{5y^2}}$

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

(c). $\dfrac{\dfrac{x}{\sqrt{y}}+\sqrt{y}}{x+y}$

3. Rewrite the following so that only positive exponents remain and simplify [No calculator]. $\left(4^{-1}-2^{-3}\right)^{-1}$

4. Solve the following equations for x.

(a). $2(x+3)+4x=3(x-1)$

(b). $3(x-2)=6x-6$

(c). $\dfrac{3x}{4}+2=\dfrac{2x-1}{5}$

(d). $\dfrac{2}{3}-\dfrac{1}{x}=\dfrac{6}{5x}$

(e). $\dfrac{4x}{x-1}+\dfrac{2}{3}=\dfrac{4}{x-1}$

5. Solve for y in terms of x: $2x+\dfrac{3}{2}y=8$

6. A company manufactures and sells highlighter markers. The total cost and revenue (in dollars) for x packages of markers is given below. How many packages of markers must they sell to break even?

Total Cost $=3x+586$ and Total Revenue $=15x$.

7. In seawater, the pressure p is related to the depth d according to $33p-18d=495$ where p is in pounds per square inch and d is in feet.
The Titanic was discovered at a depth of 12,460 ft. Find the pressure at this depth.

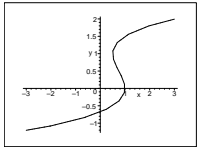**8.** If $f(x) = 3x - 4$, find the following

(a). $f(3)$ **(b).** $f\left(\dfrac{1}{4}\right)$ **(c).** $f(2.3)$ **(d).** $f(x+h) - f(x)$

9. If $f(x) = -2x^2 + 5$, find the following

(a). $f(0)$ **(b).** $f(-2)$ **(c).** $f(x-1)$ **(d).** $f(x) - f(1)$

10. (a). Does the graph below represent y as a function of x? Explain. **(b).** If $y = 4x^3$, is y a function of x?

11. Find the domain and range for

(a). $f(x) = \sqrt{x+9}$ **(b).** $y = x^2 + 3$ **(c).** $f(x) = \dfrac{x}{3x+5}$ [Domain only]

12. Given $f(x) = \sqrt{x}$ and $g(x) = \dfrac{2}{\sqrt{x}}$, find and simplify

(a). $(f+g)(x)$ **(b).** $\left(\dfrac{f}{g}\right)(x)$ **(c).** $f^2(x) = (f \cdot f)(x)$

13. Given $f(x) = \dfrac{1}{2x}$ and $g(x) = 1 - 3x$, find and simplify

(a). $(f \cdot g)(x)$ **(b).** $(f \circ g)(x)$ **(c).** $(g \circ g)(x)$

14. The phone company charges \$72 for the service call, plus \$48 per hour. Let x be the number of hours they work.

(a). Write an expression for the dollars you pay for x hours.

(b). How much is the bill, if they work half an hour?

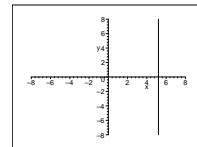**(c).** How long did they work if the bill was \$154.80 ?

15. For each of the following lines, find the x-and y-intercept and graph the line. [No Calculator]

(a). $6x - 3y = -24$ **(b).** $y = 3x - 4$

16. For the given graph, the slope of the line is (circle one)

positive   negative   0   undefined

17. Find the equation of each line given the following information. [Write your answer in the form $y = mx + b$.]

(a). line passes through the points $(-3, 4)$ $(9, 8)$

(b). line with a y-intercept of 5 and perpendicular to $3x + 5y = 4$

18. A car starts with a full tank of gas. After driving 20 miles there are 11 gallons of gas left. After driving 100 miles there are still 7 gallons left.

(a). Write a linear equation for the number of gallons of gas left as a function of the number of miles driven.

(b). If you have 3 gallons left, how far have you driven?

(c). How many gallons of gas does the tank hold when it is full?

<center>Use the homework for more word problem practice.</center>

<center>Answers</center>

1.
(a). $\dfrac{x-3}{3}$

(b). $\dfrac{-1}{(1+x)(x+4)}$

(c). $-\dfrac{3}{4}$

(d). $\dfrac{19+6x}{12}$

(e). $\dfrac{4x^2-3x-14}{(x+2)(x-2)}$

(f). $\dfrac{3b}{16}$

2.
(a). $\dfrac{15y(3+4y)}{2(10y+3)}$

(b). $\dfrac{x-3}{(x+1)(x^2+1)}$

(c). $\dfrac{1}{\sqrt{y}}$

3. 8

4.
(a). $x=-3$

(b). $x=0$

(c). $x=-\dfrac{44}{7}$

(d). $x=\dfrac{33}{10}$

(e). No solution

5. $y=\dfrac{16}{3}-\dfrac{4}{3}x$

6. $x=\dfrac{586}{12}\approx 48.833 \Longrightarrow 49$ packages.

7. $p=6811.3636$ pounds per square inch.

8.
(a). $f(3) = 5$ **(b)**. $f\left(\dfrac{1}{4}\right) = \dfrac{-13}{4}$ **(c)**. $f(2.3) = 2.9$ **(d)**. $f(x+h) - f(x) = 3h$

9.
(a). $f(0) = 5$ **(b)**. $f(-2) = -3$ **(c)**. $f(x-1) = -2x^2 + 4x + 3$ **(d)**. $f(x) - f(1) = -2x^2 + 2$

10.
(a). No, it is not a function because it fails the Vertical Line Test   **(b)**. Yes, for each x there is only one y-value.

11.
(a). domain: $x \geq -9$; range: $y \geq 0$ **(b)**. domain: All real; range: $y \geq 3$ **(c)**. domain: All real except $x \neq -\frac{5}{3}$

12.
(a). $\dfrac{x+2}{\sqrt{x}}$ **(b)**. $\dfrac{x}{2}$ **(c)**. x

13.
(a). $\dfrac{1-3x}{2x}$ **(b)**. $\dfrac{1}{2-6x}$ **(c)**. $-2 + 9x$

14.
(a). $72 + 48x$
(b). \$96
(c). $x = 1.725$ hours

15.
(a). x-int : $(-4, 0)$ y-int$(0, 8)$ **(b)**. x-int : $(4/3, 0)$ y-int$(0, -4)$

16. undefined

17.
(a). $y = \dfrac{1}{3}x + 5$ **(b)**. $y = \dfrac{5}{3}x + 5$

18.
(a). x = miles driven and y = gallons left $\Rightarrow$ $y = -\dfrac{1}{20}x + 12$
(b). 180 miles
(c). 12

USE THE HOMEWORK FOR MORE WORD PROBLEM PRACTICE.