Worksheet
Math 71

1. Solve the following system of linear equations:

a) $\begin{cases} 3(2x-7y+1)-3 = x-5y+2 \\ x-5y-7 = 2(3x+7y-1) \end{cases}$

b) $\begin{cases} \frac{3}{2}(x-5y+1)-\frac{3}{4}(2x+7) = y+2 \\ \frac{5}{3}(x-7y-2)-y+9 = 3x-2 \end{cases}$

c) $\begin{cases} 5x-7y = -2 \\ -10+14y = 7 \end{cases}$

d) $\begin{cases} 3x-10y = -2 \\ -15x+50y = 10 \end{cases}$

e) $\begin{cases} r+\frac{3}{2}s+6t = 2 \\ 2r-3s+3t = 0.5 \\ r+s+t = 1 \end{cases}$

2. Solve the following application problems
   a) A collection of 34 coins consists of dimes and nickels. The total value is \$1.90. How many dimes and how many nickels are there?
   b) Phil mixes nuts worth \$1.60 per pound with oats worth \$1.40 per pound to get 20 lb of trail mix worth \$1.54 per pound. How many pounds of nuts and how many pounds of oats should be used?
   c) McDonald's recently sold small soft drinks for 89cents, medium soft drinks for 99cents, and large soft drinks for \$1.19. During a lunch-time rush, Chris sold 55 soft drinks for a total of \$54.95. The number of small and large drinks, combined, was 5 few than the number of medium drinks. How many drinks of each size were sold?

3. Factor the following:

a) $5x^3y^3(2x-1)^3 - 25x^7y^3(2x-1)^3 + 15x^8y^7(2x-1)^4$

b) $y^3+3y^2+4y+12$

c) x^2+9x+8

d) $2x^2+34x-220$

e) $3x^2+10x-8$

f) $6x^6-19x^5+10x^4$

g) $\frac{1}{25x^4y^6}-z^2$

h) $16y^2-24y+9-25x^2$

i) $4y^{4n}+20y^{2n}+20y^{2n}+100$

k) $63x^4y^2-87x^3y^3-30x^2y^4$

l) $x^{12}-y^3z^{12}$

m) $x^{12}-81$

n) $\frac{1}{x^4y^8}-25z^8$

4. Solve the following equations:

a) $(x-4)(x+4) = 20$

b) $8x^3+10x^2+3x = 0$

c) $x^4+100 = 29x^2$

d) $(x+1)^2-5(x+2) = 3x+7$

e) $\frac{x^2}{4}-\frac{5x}{2} = -6$

f) $x^3+4x^2-x = 4$

5. Do problems 71 – 81 on pages 392 – 393.

6. Simplify the following expressions

a) $\frac{x^2-1}{x^2-4}\cdot\frac{x^2-5x+6}{x^2-2x-3}$

b) $\frac{y^2+y}{y^2-4}\div\frac{y^2+10y+25}{y^2+4y-5}$

c) $\frac{xy-y^2}{x^2+2x+1}\div\frac{2x^2+xy-3y^2}{2x^2+5xy+3y^2}$

d) $\frac{x}{x+3}+\frac{x}{x-3}-\frac{9}{x^2-9}$

e) $\dfrac{y}{y^2+5y+6}-\dfrac{2}{y^2+3y+2}$

f) $\dfrac{x^2-5x-2}{6x^2-11x-35}-\dfrac{x^2-7x+5}{6x^2-11x-35}$

g) $\dfrac{\dfrac{4}{x+3}}{\dfrac{2}{x-2}-\dfrac{1}{x^2+x-6}}$

h) $\dfrac{\dfrac{2}{x+3}+\dfrac{5x}{x^2-9}}{\dfrac{4}{x+3}+\dfrac{3}{x+2}}$

i) $\dfrac{x^{-2}+x^{-1}}{x^{-2}-x^{-1}}$

j) $\dfrac{\dfrac{2}{3x^3}-\dfrac{1}{2x}}{\dfrac{7}{x^4}+\dfrac{5}{2x^2}}$

k) $\dfrac{\dfrac{2}{a^2}-\dfrac{1}{ab}-\dfrac{1}{b^2}}{\dfrac{1}{2a^2}-\dfrac{3}{ab}+\dfrac{2}{b^2}}$

7. Find the domain of the following functions. Give the answer in the interval notation.

a) $f(x)=\dfrac{1}{4x^2-25}$ b) $f(x)=\dfrac{2x-7}{x^2-12x+20}$ c) $f(x)=\dfrac{5-7x^2}{2x^2-5x+3}$

8. Perform the following quotients:

a) $\dfrac{30x^2y^3-15x^5y^2+45x^8y^4}{9x^3y^3}$

b) $\dfrac{5x^2y(3x-1)^3-20x^3y^2(3x-1)^4+25x^4y^2(3x-1)^2}{5x^2y(3x-1)^2}$

c) $\dfrac{9x^3-3x^2-3x+4}{3x+2}$

d) $\dfrac{5x^4-3x^2+7x-2}{x+4}$

e) $\dfrac{7x^6-2x^5+3x^2-1}{x+3}$

f) $\dfrac{x^5-2x^4-x^3+3x^2-x+1}{x-2}$

9. Use synthetic division and the Remainder Theorem to find the indicated function value.

a) $f(x)=x^4-5x^3+5x^2+5x-6;\ f(2)$ b) $f(x)=7x^4-3x^3+6x+9;\ f(-5)$

c) $f(x)=3x^7-5x^6+2x^3-5x+10;\ f(-2)$

10. Use synthetic division to show that the number given to the right of each equation is a solution of the equation. Then solve the polynomial equation.

a) $3x^3+7x^2-22x-8=0;\ -4$

b) $2x^3-3x^2-11x+6=0;\ -2$

11. Solve the following equations:

a) $\dfrac{x}{x-8}+\dfrac{6}{x-2}=\dfrac{x^2}{x^2-10x+16}$

b) $\dfrac{2x+7}{x+5}-\dfrac{x-8}{x-4}=\dfrac{x+18}{x^2+x-20}$

c) $\dfrac{4}{x^2+3x-10}-\dfrac{1}{x^2+x-6}=\dfrac{3}{x^2-x-12}$

12. Solve each formula for the specified variable.

a) $\dfrac{1}{f}=\dfrac{1}{g}+\dfrac{3}{2h}$ for h.

b) $f=\dfrac{f_1 f_1}{f_1+f_2}$ for f_1

c) $P=\dfrac{A}{1-r}$ for r

13. Solve the following application problems:

a) The water's current is 2 miles per hour. A boat can travel 6 miles downstream, with the current, in the same amount of time it travels 4 miles upstream, against the current. What is the boat's average rate in still water?

b) It takes one pipe 3 hours to fill a pool and a second pipe 4 hours to drain the pool. The pool is empty and the first pipe begins to fill it. The second pipe is accidentally left open, so the water is also draining out of the pool. Under these conditions, how long will it take to fill the pool?

c) Working together, John and Thomas can clear a lot in 12 hours. Working alone, it takes John 10 hours longer than Thomas to do he job. How long would it take John to clearly the lot working alone?

d) The gravitational force with which Earth attracts an object varies inversely as the square of the distance from the center of Earth. A gravitational force of 160 pounds acts on an object 400 miles from Earth's center. Find the force of attraction on an object 6000 miles from the center of Earth.

e) The electrical resistance of a wire varies directly as its length and inversely as the square of its diameter. A wire of 720 feet with 0.25-inch diameter has a resistance of 1.5 ohms. Find the resistance for 960 feet of the same kind of wire if its diameter is doubled.