NO Calculator Practice

1. Solve for x **algebraically**. **Show your work**. Check your answers and **eliminate extraneous solutions**. No Calculator Allowed to do these problems. You can check using your graphing calculator to study.

a. $3(x+1)^2 - 5 = 43$	b. $\sqrt{1-2x} = 10$	c. $\lvert 2x+1 \rvert = 5$
d. $\dfrac{6x-1}{x} - \dfrac{2x}{x+1} = 3$	e. $x(2x+1) + 3(2x+1) = 0$	f. $-4x-1 = 4x(x-2)$
g. $3x^2 - 4x + 2 = x^2 + x - 6$	h. $\sqrt{37-3x} = x-3$	i. $\dfrac{4x-1}{x+1} = x-1$
j. $\dfrac{4x-1}{x} = 3x$	k. $5x^2 - x + 7 = 0$	l. $x-5 = \sqrt{3x-11}$
m. $2\lvert 3x-1 \rvert + 5 = -2x + 8$	n. $\dfrac{x+3}{x} - \dfrac{x-1}{x+3} = 4$	o. $-3(2x+1)^3 = -192$

2. Factor the expressions below completely

a. $3x^2+11x+10$	b. $6x^3-31x^2+5x$	c. $6ab^2+15ab-21a$
d. $x^2+5x-24$	e. x^3-3x^2-18x	f. $5x^3-125x$

3. ***Complete the square to write the equations below as equations of circles with center (h,k) and radius r in the form $(x-h)^2+(y-k)^2=r^2$. State the center and radius of the circle. **(Challenge)**
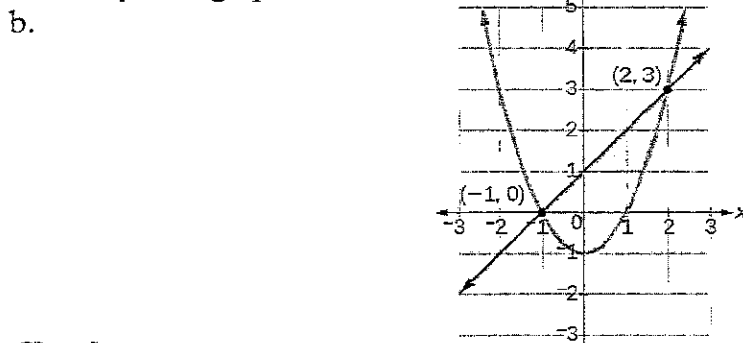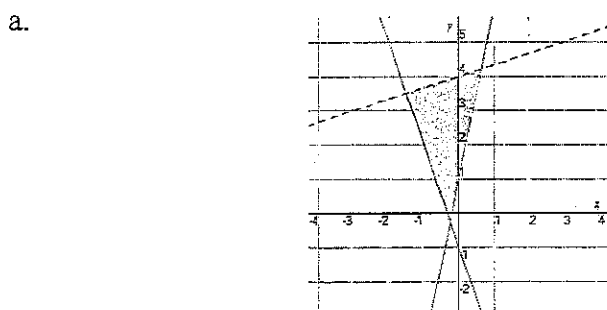
a. $x^2+y^2+6y-4x-3=0$ b. $x^2+y^2+14y-4x+33=0$ c. $4x^2+4y^2-24y-16x+51=0$

Inequalities and Systems

1. Sketch the solution of the following systems of inequalities.

a.
$$y\ge|x+2|$$
$$y\le(x+1)^2-2$$

b.
$$y\le 4x+16$$
$$y>-\frac{4}{3}x-4$$

c.
$$y<x^2-2x-3$$
$$y\le\frac{3}{4}x+2$$

d.
$$y\ge(x+1)^2-2$$
$$y\le\frac{1}{2}x+3$$

2. Write the system of inequalities with solutions represented by each graph below

a.

b.

Solve using the <u>algebraic method of your preference</u>. Clearly state your answers as an ordered pair (x, y):

3)
$$\frac{1}{2}x-y=1$$
$$y=\sqrt{x-4}+1$$

4)
$$3x+7y=32$$
$$x=5y-10$$

5) $\begin{aligned} 6x+10y &= 32 \\ 4x-2y &= 4 \end{aligned}$

6) $\begin{aligned} \frac{1}{2}y &= x-1 \\ \frac{1}{3}x^2+1 &= y \end{aligned}$

7) $\begin{aligned} x &= y^2 \\ x-y &= 6 \end{aligned}$

8) $\begin{aligned} x^2+y^2 &= 25 \\ y &= x^2-13 \end{aligned}$

lve the following Inequalities. Express your solutions algebraically and on a number line

9) $9x-15 \le 21$

10) $x^2-7 > 42$

11) $4\left|\frac{1}{3}x+10\right|+4 \le 12$

12) $x^2+2x-2 \le 22$

13) $x^2-2x-15 < 0$

14) $\sqrt{x-5}-3 \le 5-4x$

15. For the following equations, find the discriminant and hence find all values of k for which the equation has the indicated number of roots.

    a. $x^2+(k+2)x+4=0$ Two distinct real roots

    b. $(k+1)x^2+kx+k=0$ No real roots

c. $2x^2 + (k-2)x + 2 = 0$ Two equal real roots/one real root

d. $x^2 + (3k-1)x + 2k + 10 = 0$ Two distinct real roots

CALCULATOR Problems Practice. *You should use the calculator for all problems in this page*

Solve the following systems of equations using your graphing calculator. Use your calculator Zooming capabilities to find ALL points of intersection. Show a sketch in this paper.

a) $y = \dfrac{4}{(x^2+1)}$
$y = 3\sqrt{x+2} - 1$

b) $y = |2x+1|$
$y = x^2$

Use systems of equations to solve the following problems. Define your variables.

1. Jeff buys some shirts and spends a total of $90. If the shirts had been $5 less then he would have been able to spend the same amount of money and bought 3 more shirts. How many shirts did he buy originally?

2. The sum of two numbers is 6 and the product of the two numbers is $\dfrac{35}{4}$. Find the two numbers

3. A frog jumps to catch a grasshopper. The frog reaches a maximum height of 25 cm and travels a horizontal distance of 100 cm. A grasshopper, located 30 cm in front of the frog, starts to jump at the same time as the frog. The grasshopper reaches a maximum height of 36 cm and travels a horizontal distance of 48 cm. The frog and the grasshopper both jump in the same direction.

   a. Consider the frog's starting position to be at the origin of a coordinate grid. Draw a diagram to model the given information

   b. Determine a quadratic equation to model the frog's height compared to the horizontal distance it travelled and a quadratic equation to model the grasshopper's height compared to the horizontal distance it travelled.

   c. Solve the system of two equations.

   d. Interpret your solution in the context of this problem.