SHOW ALL WORK ON THIS TEST OR ON SEPARATE PAPER.   Circle answers.
TURN IN ALL WORKSHEETS.   CALCULATORS ARE REQUIRED ON THIS TEST.
EXPLAIN OR DESCRIBE CALCULATOR METHODS.    SKETCH AND LABEL ALL GRAPHS!

1.   Solve the systems of equations (use the method of your choice):

a)   $-3x + 7y = 4$        b) $-8x + 6y = 32$
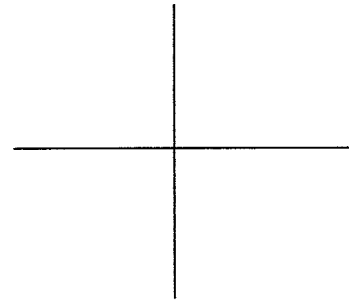     $2x - 3y = -6$              $x = 2y + 6$

2.   Solve the systems of equations (you may use a calculator, but
     show all work by an algebra method.):

a)       $y = 5x + 10$        b)    $2x - 7y = 20$
         $10x = 2y - 20$            $-4x + 14y = 40$

3.   Graph the intersection:
     $x + 3y < 6$
     $x - 2y \geq -4$
     $x \leq 0$

4.   Solve the system:

     $8x + 3y + 2z = 3$
     $4x + 5y = 7$
     $2y - 3z = -9$

In 5 - 6, solve the systems of equations by method of your choice. Show your work, sketch a graph, or explain what you did!

5. Solve the system:

$$y = x^2 - 2x - 5$$
$$y = 3x + 1$$

6. Solve the system:
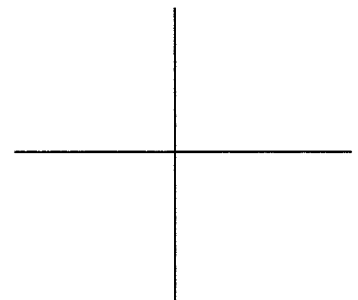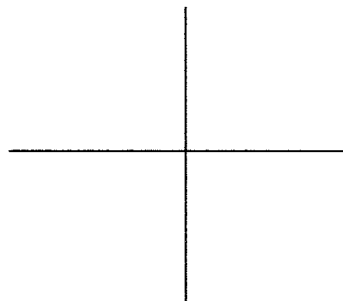
$$x^2 + 6xy + 9y^2 = 25$$
$$x - 2y = -10$$

7. Find the remainder if $x^5 - 2x + 1$ is divided by $x + 2$.

8. Find the equation whose roots are $x = 2$, $x = -5$, and $x = -1 \pm 3i$.

In 9 - 10, give the intercepts and sketch the graphs:

9. $y = x(x + 5)^2(x - 3)^3$

10. $y = x^3 - 15x^2$

11. Sketch the graph.  Verify the roots by synthetic division.
$$y = x^4 - x^3 - 13x^2 + 25x - 12$$

In 12 - 13, find all roots and multiplicities. Give radical form
of irrational roots. (Use calculators and synthetic
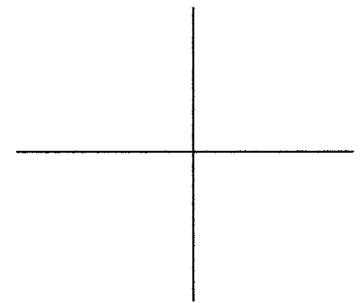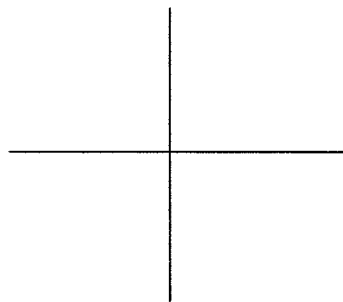division to show your work!).

12. $x^3 + 2x^2 - 7x + 4 = 0$       13. $x^4 - 3x^3 - 28x^2 + 66x - 36 = 0$

In 14 - 15, solve the inequalities.  In the process you should find
<u>all</u> roots and give final answer in interval notation.
Sketch the graphs if you use calculator methods.

14a) $|12 - 2x| \geq 10$       15a) $(x+2)^3(x-4)^4(x-1) > 0$

b) $|12 - 2x| < 10$       b) $(x+2)^3(x-4)^4(x-1) \geq 0$

                       c) $(x+2)^3(x-4)^4(x-1) < 0$

COLLEGE ALGEBRA   UGR   Solutions

1a) $-3x+7y=4$
$2x-3y=-6$
Polysmlt : $\boxed{(-6,-2)}$

b) $-8x+6y=32$
$x=2y+6$
$-8x+6y=32$
$x-2y=6$
Polysmlt $=\boxed{(-10,8)}$

2a) $y=5x+10$
$10x=2y-20$
$10x=2(5x+10)-20$
$10x=10x+20-20$
$0=0$
$\boxed{Same Line}$

d) $^2(2x-7y=20)$
$-4x+14y=40$
$4x-14y=40$
$-4x+14y=40$
$0=80$
$\boxed{No Solution}$
$\boxed{Parallel Lines}$

3. $x+3y<6$

| x | y |
|---|---|
| 0 | 2 |
| 6 | 0 |

Dotted Line
Shade Below
$x\leq 0$
Left of y-axis

$x-2y\geq -4$

| x | y |
|---|---|
| 0 | 2 |
| -4 | 0 |

Solid Line
Shade Below
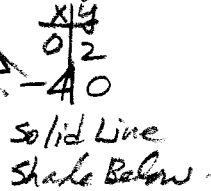


4. $\boxed{Polysmlt = (-2,3,5)}$

5. $y=x^2-2x-5$
$y=3x+1$
$x^2-2x-5=3x+1$
$x^2-5x-6=0$
$(x-6)(x+1)$
$x=6$   $x=-1$

$x=6$   $x=-1$
$y=3x+1$  $y=3x+1$
$y=19$  $y=-2$
$\boxed{(6,19)}$ $\boxed{(-1,-2)}$

6. $x^2+6xy+9y^2=25$
$x-2y=-10$  or $x=2y-10$
$(2y-10)^2+6(2y-10)y+9y^2=25$
$4y^2-40y+100+12y^2-60y+9y^2-25=0$
$25y^2-100y+75=0$ ← OR
$25(y^2-4y+3)=0$   use Polysmlt
$25(y-3)(y-1)=0$
$y=3$   $y=1$

$x=2y-10$   $x=2y-10$
$x=-4$   $x=-8$
$\boxed{(-4,3)}$  $\boxed{(-8,1)}$

7. $(x^5-2x+1)\div(x+2)$
$P(-2)=(-2)^5-2(-2)+1$
$=-32+4+1$
$=\boxed{-27}$

OR  $-2|1\ 0\ 0\ 0\ -2\ 1$
$\underline{\ \ \ \ -2\ 4\ -8\ 16\ -28}$
$1\ -2\ 4\ -8\ 14\ \boxed{-27}$

8. $x=2$ $x=-5$    $x=-1\pm 3i$
$(x-2)(x+5)=0$  $x+1=\pm 3i$
$(x^2+3x-10)=0$  $(x+1)^2=(\pm 3i)^2$
$x^2+2x+1=9i^2$
$x^2+2x+1=-9$
$\boxed{(x^2+3x-10)(x^2+2x+10)=0}$

9. $y=x(x+5)(x-3)^3$
$\boxed{Intercepts\ (0,0)\ (-5,0)\ (3,0)}$



10. $y=x^3-15x^2$
$y=x^2(x-15)$
$x=0$ $x=15$
$\boxed{(0,0)\ (15,0)}$
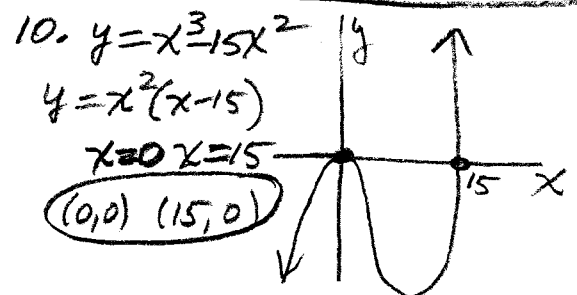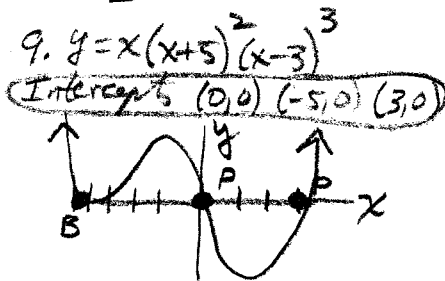


11. $y=x^4-x^3-13x^2+25x-12$

$1|\ 1\ -1\ -13\ 25\ -12$
$\ \ \ \downarrow\ \ 1\ \ 0\ -13\ 12$
$\ \ \ \ 1\ \ 0\ -13\ 12\ \ 0$
$1|\ \ \ \downarrow\ 1\ \ 1\ \ 12$
$\ \ \ \ 1\ \ 1\ -12\ \ 0$

$x^2+x-12=0$
$(x+4)(x-3)=0$
$\boxed{x=-4\ \ x=3\ \ x=1\ (mult\ 2)}$

Degree = 4 Opens up on both sides!
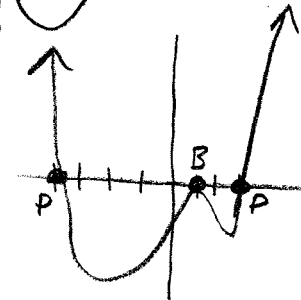


12. $x^3+2x^2-7x+4=0$
$-4|\ 1\ 2\ -7\ 4$
$\ \ \ \ \downarrow\ -4\ 8\ -4$
$\ \ \ \ 1\ -2\ 1\ \ 0$
$x^2-2x+1=0$
$(x-1)^2=0$
$\boxed{x=-4\ \ x=1\ (mult\ 2)}$

13. $x^4-3x^3-28x^2+66x-36=0$
$6|\ 1\ -3\ -28\ 66\ -36$
$\ \ \ \downarrow\ 6\ 18\ -60\ 36$
$1|\ 1\ 3\ -10\ 6\ \ 0$
$\ \ \ \downarrow\ 1\ 4\ -6$
$\ \ \ 1\ 4\ -6\ \ 0$
$x^2+4x-6=0$
$x^2+4x+4=6+4$
$(x+2)^2=10$
$x+2=\pm\sqrt{10}$
$\boxed{x=-2\pm\sqrt{10},\ 6,\ 1}$

14a) $|12-2x|\geq 10$
$y1=|12-2x|-10\geq 0$

$12-2x=10$
$-2x=-2$
$\boxed{x=1}$  Above

$12-2x=-10$
$-2x=-22$
$\boxed{x=11}$



14a) $\boxed{(-\infty,1]\cup[11,\infty)}$

b) $|12-2x|<10$ Below
$\boxed{(1,11)}$

15. $y1=(x+2)^3(x-4)^4(x-1)$
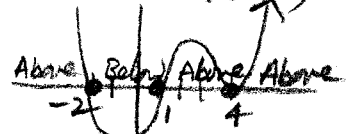


a) $(x+2)^3(x-4)^4(x-1)>0$ ABOVE
$\boxed{(-\infty,-2)\cup(1,4)\cup(4,\infty)}$

b) $\geq 0$ On or Above
$\boxed{(-\infty,-2]\cup[1,\infty)}$

c) $<0$ BELOW
$\boxed{(-2,1)}$