COLLEGE ALGEBRA   EXAM 3 KG R^2   NAME _____

SHOW ALL WORK ON THIS TEST OR ON SEPARATE PAPER. Circle answers.
TURN IN <u>ALL</u> WORKSHEETS. CALCULATORS ARE REQUIRED ON THIS TEST.

1.   Solve the systems of equations. (Explain or show what you did.)

a) $50x - 9y = 1$
     $7x - 2y = -8$

b) $4x = 2y - 8$
     $y - 2x = 4$

c) $5y - 3y = 34$
     $x = 7 - 2y$

d) $x - 2y = -6$
     $6y - 3x = -18$

2.   Solve the system:

$3x + 4y + z = 2$
$7x + 2y + 4z = 5$
$-2x + y - 2z = -6$

3.   Solve the system:

$3x + 2y = -2$
$2y - 3z = 1$
$-x + 2y - 2z = -4$

4.   Solve the system:

$y = 3x + 20$
$y = x^2 + 4x$

5.   Solve the system:

$x^2 + 6xy + 9y^2 = 25$
$x - 2y = -10$

1

6.   Graph :

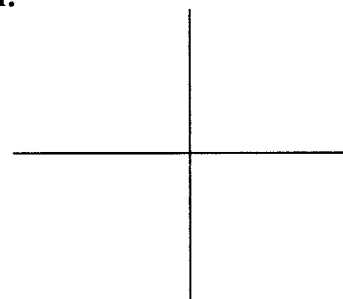a) $y1 = (x + 3)^2 (x - 2)^4 (x - 6)$

7.   Graph the intersection:

$$x > 0$$
$$2x - 3y \geq 12$$
$$7x + 4y < 28$$

Solve for x and give interval notation for:

b) $(x + 3)^2 (x - 2)^4 (x - 6) < 0$

c) $(x + 3)^2 (x - 2)^4 (x - 6) \leq 0$

8.   Find the remainder if $x^5 - 6x^3 + 3$ is divided by $x + 2$.

9.   Find a quadratic equation whose roots are $x = -7$ and $x = 9$.

10.   Find an equation whose roots are $x = -5$ and $x = -6 \pm i\sqrt{7}$.

In 11 - 13, find all roots and multiplicities by synthetic division:

11. $x^3 - 2x^2 - 7x - 4 = 0$

12. $x^4 - 5x^3 + x^2 + 21x - 18 = 0$

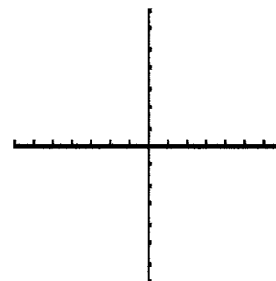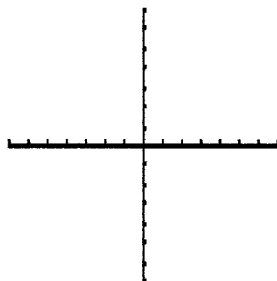13. Use your calculator to find all roots. Verify by synthetic division.
Give irrational roots in radical form:
$x^4 - 11x^3 + 20x^2 + 56x + 24 = 0$

In 14 - 15, give the roots and sketch the graphs:

14. $y = x^3 + 13x^2 - 30x$

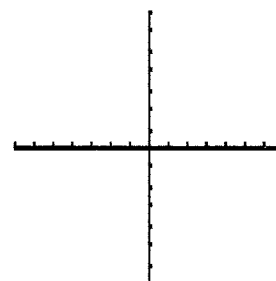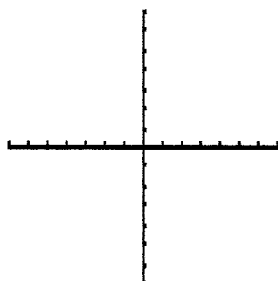15. $y = x^5 + 2x^4 - 4x^3 - 8x^2$

In 16 - 17, solve the inequalities. Give interval notation.
Sketch graphs when using graphing methods.

16. $|x - 8| \geq 8$

17. $-7x^2 + 5x < 0$ (Give exact form!)

COLLEGE ALGEBRA EXAM 3 KG Solutions

1a) $50x - 9y = 1$
$7x - 2y = -8$
Simult Eg Solver
$(2, 11)$

b) $4x = 2y - 8$
$y - 2x = 4$
$4x - 2y = -8$
$-2x + y = 4$
Same Line

c) $5y - 3x = 34$
$x = 7 - 2y$
$-3x + 5y = 34$
$x + 2y = 7$
$(-3, 5)$

d) $x - 2y = -6$
$6y - 3x = -18$
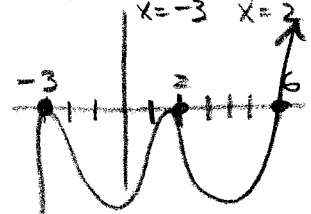$x - 2y = -6$
$-3x + 6y = -18$
No Sol: Parallel Lines

2. $3x + 4y + z = 2$
$7x + 2y + 4z = 5$
$-2x + y - 2z = -6$
$(-5, 2, 9)$

3. $3x + 2y = -2$
$2y - 3z = 1$
$-x + 2y - 2z = -4$
$(2, -4, -3)$

4. $y = 3x + 20$
$y = x^2 + 4x$
$x^2 + 4x = 3x + 20$
$-3x \quad -3x \quad -20$
$x^2 + x - 20 = 0$
$(x+5)(x-4) = 0$
$x = -5 \quad x = 4$
$y = 3x + 20 \quad y = 3x + 20$
$y = 5 \quad\quad y = 32$
$(-5, 5) \quad (4, 32)$

5. $x^2 + 6xy + 9y^2 = 25$
$x - 2y = -10 \Rightarrow x = 2y - 10$
$(2y-10)^2 + 6(2y-10)y + 9y^2 = 25$
$4y^2 - 40y + 100 + 12y^2 - 60y + 9y^2 - 25 = 0$
$25y^2 - 100y + 75 = 0$
$25(y^2 - 4y + 3) = 0$
$25(y-3)(y-1) = 0$
$y = 3 \quad\quad y = 1$
$x = 2y - 10 \quad x = 2y - 10$
$x = -4 \quad\quad x = -8$
$(-4, 3)$
$(-8, 1)$

6a) $y1 = (x+3)^2 (x-2)^4 (x-6)$
$x = -3 \quad x = 2 \quad x = 6$
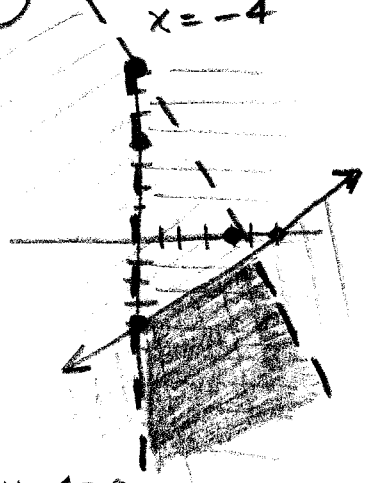

b) $(x+3)^2 (x-2)^4 (x-6) < 0$ Below
$(-\infty, -3) \cup (-3, 2) \cup (2, 6)$
c) $(x+3)^2 (x-2)^4 (x-6) \leq 0$ On or Below
$(-\infty, 6]$

7. $x > 0$
$2x - 3y \geq 12$
$7x + 4y < 28$

x	y
0	-4
6	0

x	y
0	7
4	0

8. $P(x) = x^5 - 6x^3 + 3$
$P(-2) = (-2)^5 - 6(-2)^3 + 3$
$= 19$

or $-2 \underline{| 1 \quad 0 \quad -6 \quad 0 \quad 0 \quad 3}$
$\quad\quad \downarrow -2 \quad 4 \quad 4 \quad -8 \quad 16$
$\quad\quad 1 \quad -2 \quad -2 \quad 4 \quad -8 \quad 19$

9. $x = -7 \quad x = 9$
$(x+7)(x-9) = 0$
$x^2 - 2x - 63 = 0$

10. $x = -5 \quad x = -6 \pm i\sqrt{7}$
$(x+5) \quad (x+6)^2 = (\pm i\sqrt{7})^2$
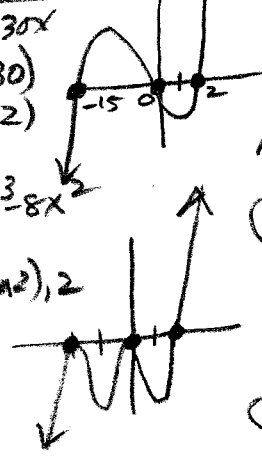$x^2 + 12x + 36 = 7i^2 = -7$
$(x+5)(x^2 + 12x + 43) = 0$

11. $x^3 - 2x^2 - 7x - 4 = 0$
$-1 \underline{| 1 \quad -2 \quad -7 \quad -4}$
$\quad\quad \downarrow -1 \quad 3 \quad 4$
$\quad\quad 1 \quad -3 \quad -4 \quad 0$
$(x^2 - 3x - 4) = 0$
$(x-4)(x+1) = 0$
$x = 4, \quad x = -1 \ (m2)$

12. $x^4 - 5x^3 + x^2 + 21x - 18 = 0$
$1 \underline{| 1 \quad -5 \quad 1 \quad 21 \quad -18}$
$\quad\quad \downarrow 1 \quad -4 \quad -3 \quad 18$
$-2 \underline{| 1 \quad -4 \quad -3 \quad 18 \quad 0}$
$\quad\quad \downarrow -2 \quad 12 \quad -18$
$\quad\quad 1 \quad -6 \quad 9 \quad 0$
$x^2 - 6x + 9 = 0$
$(x-3)(x-3) = 0$
$x = 3 \ (m2), 1, -2$

13. $x^4 - 11x^3 + 20x^2 + 56x + 24 = 0$
$-1 \underline{| 1 \quad -11 \quad 20 \quad 56 \quad 24}$
$\quad\quad \downarrow -1 \quad 12 \quad -32 \quad -24$
$\quad\quad 1 \quad -12 \quad 32 \quad 24 \quad 0$
$6 \underline{| 1 \quad -12 \quad 32 \quad 24}$
$\quad\quad \downarrow 6 \quad -36 \quad -24$
$\quad\quad 1 \quad -6 \quad -4 \quad 0$
$x^2 - 6x - 4 = 0$
$x^2 - 6x + \_\_ = 4 + \_\_$
$x^2 - 6x + 9 = 4 + 9$
$(x-3)^2 = 13$
$x - 3 = \pm\sqrt{13}$
$x = 3 \pm \sqrt{13}, -1, 6$

14. $y = x^3 + 13x^2 - 30x$
$x(x^2 + 13x - 30)$
$x(x+15)(x-2)$
$x = 0, -15, 2$

15. $y = x^5 + 2x^4 - 4x^3 - 8x^2$
PolySimIt:
$x = 0 \ (m2), -2 \ (m2), 2$

16. $|x - 8| \geq 8$
$(-\infty, 0] \cup [16, \infty)$
Above Below Above

17. $-7x^2 + 5x < 0$
$x(-7x + 5) < 0$
$x = 0 \quad x = 5/7$
$(-\infty, 0) \cup (5/7, \infty)$