EXAM 3/CHAPTERS 5-6
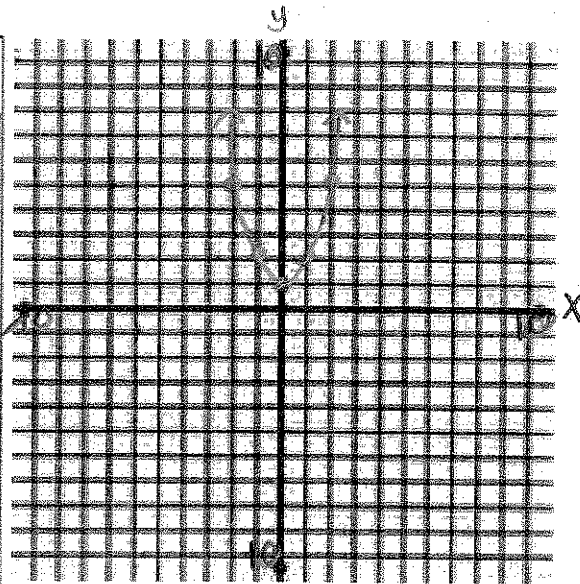86 POINTS POSSIBLE   NAME___Key_____

LEAVE ALL ANSWERS EXACT (NO DECIMALS!) UNLESS THE PROBLEM INDICATES OTHERWISE

SHOW ALL WORK IN ORDER TO EARN FULL CREDIT

1. (5 POINTS) Graph the equation $y = x^2 + 1$ by plotting 5 points. **LABEL AXES AND WRITE IN THE SCALE!**

x	$y = x^2 + 1$	(x, y)
-2	$y = (-2)^2 + 1 \to y = 4 + 1 \to y = 5$	$(-2, 5)$
-1	$y = (-1)^2 + 1 \to y = 1 + 1 \to y = 2$	$(-1, 1)$
0	$y = (0)^2 + 1 \to y = 0 + 1 \to y = 1$	$(0, 1)$
1	$y = (1)^2 + 1 \to y = 1 + 1 \to y = 2$	$(1, 2)$
2	$y = (2)^2 + 1 \to y = 4 + 1 \to y = 5$	$(2, 5)$

2. (3 POINTS) Subtract, as indicated.

$$\left(-4x^2 - 8x^2y - 13xy^2 - 6y^2\right) - \left(2x^2 - 4xy^2 + 10y^2\right)$$

$$= -4x^2 - 8x^2y - 13xy^2 - 6y^2 - 2x^2 + 4xy^2 - 10y^2$$

$$= -4x^2 - 2x^2 - 8x^2y - 13xy^2 + 4xy^2 - 6y^2 - 10y^2$$

$$= \boxed{-6x^2 - 8x^2y - 9xy^2 - 16y^2}$$

3. (2 POINTS) Determine the degree of the polynomial.

$$3x^4 + x^2y^4 - y^5$$
$$\uparrow \qquad \uparrow \qquad \uparrow$$
$$4 \qquad 6 \qquad 5$$

Degree:____6____

4. (10 POINTS) Multiply and simplify.

a. (2 POINTS)

$$\left(11x^{-2}y^{-1}\right)\left(4x^{-5}y^{3}\right) = 44x^{-2+(-5)}y^{(-1)+3}$$

$$= 44x^{-7}y^{2}$$

$$= \boxed{\dfrac{44y^{2}}{x^{7}}}$$

b. (4 POINTS)

$$(2x+1)^{2}$$

$$= (2x+1)(2x+1)$$

$$= 2x(2x+1)+1(2x+1)$$

$$= 4x^{2}+2x+2x+1$$

$$= \boxed{4x^{2}+4x+1}$$

c. (4 POINTS)

$$(x-5)\left(3x^{2}-10x+2\right)$$

$$= x(3x^{2}-10x+2)-5(3x^{2}-10x+2)$$

$$= 3x^{3}-10x^{2}+2x-15x^{2}+50x-10$$

$$= \boxed{3x^{3}-25x^{2}+52x-10}$$

5. (8 POINTS) Divide.

a. (3 POINTS)

$$\dfrac{48x^{4}y^{3}+32x^{3}y^{2}-16x^{2}y}{8x^{2}y}$$

$$= \dfrac{48x^{4}y^{3}}{8x^{2}y}+\dfrac{32x^{3}y^{2}}{8x^{2}y}-\dfrac{16x^{2}y}{8x^{2}y}$$

$$= 6x^{4-2}y^{3-1}+4x^{3-2}y^{2-1}-2x^{2-2}y^{1-1}$$

$$= 6x^{2}y^{2}+4x^{1}y^{1}-2x^{0}y^{0}$$

$$= \boxed{6x^{2}y^{2}+4xy-2}$$

b. (5 POINTS)

$$(x^2 + 6x + 1) \div (x + 2) = \boxed{x + 4 - \frac{7}{x+2}}$$

$$
\begin{array}{r}
x + 4 - \frac{7}{x+2} \\
(x+2) \overline{)\, x^2 + 6x + 1\,} \\
-(x^2 + 2x) \downarrow \\
\hline
4x + 1 \\
-(4x + 8) \\
\hline
-7
\end{array}
$$

6. (18 POINTS, 6 POINTS EACH) Factor. **I will only award partial credit if work is shown.**

a. $81x^2 - y^2 = (9x)^2 - (y)^2$

$$= \boxed{(9x + y)(9x - y)}$$

b. $x^3 + 5x^2 - 4x - 20$

$$= x^2(x+5) - 4(x+5)$$

$$= (x+5)(x^2 - 4)$$

$$= \boxed{(x+5)(x+2)(x-2)}$$

c. $x^3 + 14x^2 + 49x$

$$= x(x^2 + 14x + 49) \qquad \Rightarrow = \boxed{x(x+7)^2}$$

$$= x[x^2 + 7x + 7x + 49]$$
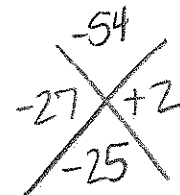
$$= x[x(x+7) + 7(x+7)]$$

$$= x(x+7)(x+7)$$

$$
\begin{array}{c}
49 \\
+7 \diagup\!\!\!\diagdown +7 \\
14
\end{array}
$$

7. (20 POINTS, 10 POINTS EACH) Factor by grouping. **No credit will be given for trial and error.**

a. $5x^2 - 11x + 6$

$= 5x^2 - 6x - 5x + 6$

$= x(5x-6) - 1(5x-6)$

$= \boxed{(5x-6)(x-1)}$

b. $9x^2 - 25xy - 6y^2$

$= 9x^2 - 27xy + 2xy - 6y^2$

$= 9x(x-3y) + 2y(x-3y)$

$= \boxed{(x-3y)(9x+2y)}$

8. (20 POINTS, 10 POINTS EACH) Solve. Your result(s) should be given in roster notation.

a. $x(x-10)(2x-7) = 0$

$x = 0$ or $x - 10 = 0$ or $2x - 7 = 0$

$x = 10$ 　　 $2x = 7$

　　　　　　　$x = \frac{7}{2}$

$$\boxed{\left\{ 0, \frac{1}{2}, 10 \right\}}$$

b. $3x^2 - 5x = 8$

　　　$-8 \quad -8$

$3x^2 - 5x - 8 = 0$

$3x^2 - 8x + 3x - 8 = 0$

$x(3x-8) + 1(3x-8) = 0$

$(3x-8)(x+1) = 0$

$3x - 8 = 0$ or $x + 1 = 0$

$3x = 8$ 　　　 $x = -1$

$x = \frac{8}{3}$

$\boxed{\left\{ -1, \frac{8}{3} \right\}}$