Name KEY

Math 103, Exam #2, Spring 2012

Instructions: Show all work. If you are using your calculator to solve, you may sketch a graph or indicate keys pressed to show work. Exact values: do not use decimals in your answers unless the problem begins with decimals, or is a word problem. All answers should be fully reduced for full credit.

1. For each of the problems below do the following:
   a. Perform the indicated operations (be careful not to confuse addition with multiplication and vice versa) and simplify the result. (4 points)
   b. State the type polynomial it is: monomial, binomial, trinomial, or polynomial (1 point)
   c. State the degree of each polynomial (1 point)

i. $(y^3 - 2y + 1) - (-3y^3 + y + 5)$

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

$\boxed{4y^3 - 3y - 4}$ trinomial, degree 3

ii. $-2(-4a^3b^2)^2 \left(\frac{3}{2}ab^5\right)^3$

$-2(16a^6b^4)\left(\frac{27}{8}a^3b^{15}\right)$

$-4(27)a^9b^{19}$

$\boxed{-108a^9b^{19}}$ monomial, degree 28

iii. $4w(2w^2 + 3w - 5)$

$8w^3 + 12w^2 - 20w$ trinomial, degree 3

iv. $(n-7)(n+4)$

$n^2-7n+4n-28$

$\boxed{n^2-3n-28}$ trinomial, degree 2

v. $(3r+5s)(6r+7s)$

$18r^2+21rs+30rs+35s^2$

$\boxed{18r^2+51rs+35s^2}$ trinomial, degree 2

vi. $(4x^2-1)(4x^2+1)$

$16x^4-1$ binomial, degree 4

vii. $(b+1)(b-2)(b+3)$ [Hint: Do two of them, and then multiply the result by the third.]

$(b^2-2b+b-2)$

$(b^2-b-2)(b+3)$

$b^3+\underbrace{3b^2-b^2}-\underbrace{3b-2b}-6$

$\boxed{b^3+2b^2-5b-6}$ Polynomial degree 3

2. Simplify the expressions. Your final answers should have only positive exponents. (4 points each)

a. $\frac{5}{(2m)^{-3}}$

$5(2m)^3 = 5(8m^3) = \boxed{40m^3}$

b. $\left(\frac{4}{3}y^{-2}z\right)\left(\frac{5}{8}y^{-2}z^4\right)$

$\frac{\cancel{20}\,5}{\cancel{24}\,6}y^{-4}z^5 = \boxed{\frac{5z^5}{6y^4}}$

c. $8x^0 - 8^0$

$8(1) - 1 = 8 - 1 = \boxed{7}$

d. $\frac{(-2a^{-3}b^2)^{-4}}{5a^2b^2c^0}$

$\frac{\frac{1}{16}a^{12}b^{-8}}{5a^2b^2} = \frac{a^{\cancel{12}\,10}}{5\cdot 16\cancel{a^2}\,b^2b^8} = \boxed{\frac{a^{10}}{80b^{10}}}$

3. Divide. You may need to use long division. If there is a remainder, write your answer in *Quotient + Remainder/Divisor* form. (5 points each)

a. $\frac{16m^3+8m^2-4}{8m^2}$

$\frac{\cancel{16}\,2\,m^{\cancel{3}}}{\cancel{8}\cancel{m^2}} + \frac{\cancel{8m^2}\,1}{\cancel{8m^2}} - \frac{\cancel{4}}{2\cancel{8}m^2}$

$\boxed{2m + 1 - \frac{1}{2m^2}}$

b. $\frac{x^3-x^2+x+8}{x+1}$

$$\begin{array}{r} x^2-2x+3 \\ x+1 \overline{) x^3-x^2+x+8} \\ -\ x^3 \mp x^2 \\ \hline -2x^2+x \\ +2x^2+2x \\ \hline 3x+8 \\ -3x\mp 3 \\ \hline 5 \end{array}$$

$$\boxed{x^2-2x+3+\frac{5}{x+1}}$$

c. $\frac{x^2+4x-32}{x-4}$

$$\frac{(x+8)\cancel{(x-4)}}{\cancel{x-4}} = \boxed{x+8}$$

4. Simplify and write in scientific notation. (4 points each)

a. $(4\text{x}10^7)(2.5\text{x}10^{-4})$

$4\times2.5 \cdot 10^7 10^{-4}$

$10 \cdot 10^3 = \boxed{1\times10^4}$

b. $\frac{4.8\times10^{-3}}{1.2\times10^{-5}}$

$\frac{4.8}{1.2}\cdot 10^{-3}\cdot 10^5 = \boxed{4\times10^2}$

5. Factor the polynomials completely. If it cannot be factored, write prime. (5 points each)

a. xy+3y+4x+12

$y(x+3)+4(x+3)$

$\boxed{(x+3)(y+4)}$

b. $p^2 - 8p + 12$

$(p-6)(p-2)$

c. $t^2+2t-38$

2, 19
1, 38

prime

d. $12n^2 + 19n + 5$

$12 \times 5 = 60$

1, 60
2, 30
3, 20
$\boxed{4, 15}$
5, 12
6, 10

$12n^2+4n+15n+5$

$4n(3n+1)+5(3n+1)$

$\boxed{(3n+1)(4n+5)}$

e. $k^8 - 256$

$$(k^4 - 16)(k^4 + 16)$$

$$(k^2 - 4)(k^2 + 4)(k^4 + 16)$$

$$\boxed{(k-2)(k+2)(k^2+4)(k^4+16)}$$

f. $x^3y^3 + 1$

$$(xy)^3 + 1^3$$

$$\boxed{(xy+1)(x^2y^2 - xy + 1)}$$

g. $4z^2 - 12z + 9$

$$(2z)^2 - 12z + 3^2$$

$$2(2z)(3) = 12z \checkmark$$

$$\boxed{(2z-3)^2}$$