Math 1030, Homework Activity #10, Summer 2014 Name KEY
Sections 6.1, 6.2

**Instructions:** Complete the following problems. You may work alone or in a group. Do not just copy answers from a group member, but be sure that you understand the problem. Similar questions will appear on exams. You may be asked to explain or present the answers to the class. This assignment is due at the end of the class period.

1. Find the greatest common factor for the following pairs or sets of numbers.
   a. 8, 12 4
   b. 12, 36, 54 6
   c. $x^{10}, x^2, x^8$ $x^2$
   d. $8a^4, 20a^3$ $4a^3$
   e. $45a^2b^3, 6ab^2c^2, 15a^3b^2c$ $3ab^2$
   f. $2(x-4)^2, 4(x-4)^3$ $2(x-4)^2$
   g. $15(2a-1)^2(2a+1), 18(2a-1)^3(2a+1)^2$ $3(2a-1)^2(2a+1)$

2. Factor the greatest common factor from the polynomial. Check that if you re-multiply the factors that you get back the original expression.
   a. $x^2 + 12x$ $x(x+12)$
   b. $3x^3 + 6x^2 - 3x$ $3x(x^2+2x-1)$
   c. $9m^5 - 18m^3 - 12m^2 + 81$ $3(3m^5 - 6m^3 - 4m^2 + 27)$
   d. $x(x-3) - 5(x-3)$ $(x-3)(x-5)$
   e. $x^2(x-1) + y^2(x-1)$ $(x-1)(x^2+y^2)$
   f. $x^2(4x+1) + 2x(4x+1) + 5(4x+1)$ $(4x+1)(x^2+2x+5)$
   g. $\frac{3}{4}p^4 - \frac{1}{4}p^3$ $\frac{1}{4}p^3(3p-1)$

3. Factor by grouping.
   a. $xy + 3y + 4x + 12$ $y(x+3)+4(x+3) = (x+3)(y+4)$
   b. $yz + z - y - 1$ $z(y+1) - 1(y+1) = (z-1)(y+1)$
   c. $x^3 - x^2 + 2x - 2$ $x^2(x-1) + 2(x-1) = (x-1)(x^2+2)$
   d. $2t^4 - t^3 - 6t + 3$ $t^3(2t-1) - 3(2t-1) = (2t-1)(t^3-3)$

4. Factor each expression. First look for any GCFs, then try factoring by grouping.
   a. $12mxz - 3xz + 24mx - 6x$ $3x(4mz - z + 8m - 2) = 3x[z(4m-1)+2(4m-1)] = 3x(z+2)(4m-1)$
   b. $2a^3 - 4a^2 + 8a - 16$ $2(a^3 - 2a^2 + 4a - 8) = 2[a^2(a-2)+4(a-2)] = 2(a-2)(a^2+4)$
   c. $15x^4 - 6x^3 + 30x^2 - 12x$ $3x(5x^3 - 2x^2 + 10x - 4) = 3x[x^2(5x-2)+2(5x-2)] = 3x(5x-2)(x^2+2)$

5. Find the missing factor to finish factoring the equation.
   a. $3 - 4x^{-1} + 2x^{-3} = x^{-3}(3x^3 - \frac{4}{3}x^2 + 2)$
   b. $\frac{6}{35}x^4 - \frac{1}{7}x^2 + \frac{2}{7}x = \frac{2}{7}x(\frac{3}{5}x^3 - 2x + 1)$

$\frac{6}{35} \cdot \frac{7}{2} = \frac{3}{5}$

6. Factor completely the expression or indicate that it is prime.

a. $m^2 + 9m + 18$ $(m+6)(m+3)$

b. $x^2 - 15x + 36$ $(x-12)(x-3)$

c. $x^2 + 6x - 20$ prime

d. $-x - 12 + x^2$ $x^2 - x - 12 = (x-4)(x+3)$

e. $x^2 - 5xy + 6y^2$ $(x-2y)(x-3y)$

f. $p^2 + 5pq - 14q^2$ $(p+7q)(p-2q)$

g. $z^2 + 7yz + 8y^2$ prime

h. $3n^3 - 24n^2 + 45n$ $3n(n^2-8n+15) = 3n(n-5)(n-3)$

i. $-3x^2 - 24x - 48$ $-3(x^2+8x+16) = -3(x+4)^2$

j. $2x^2 + x^3 - 15x$ $x^3+2x^2-15x = x(x^2+2x-15) = x(x+5)(x-3)$

k. $g^2 - 4g + 21$ prime

l. $n^4 - 30n^2 - n^3$ $n^4-n^3-30n^2 = n^2(n^2-n-30) = n^2(n-6)(n+5)$

m. $-20mn^2 + 30m^2n - 5m^3$ $-5m(m^2-6mn+4n^2)$

n. $x^2y^2 - 3xy - 18$ $(xy-6)(xy+3)$

7. Find all values for c for which the polynomial is factorable. you may assume c is >0

a. $x^2 - 2x + c$ $c = 1$

b. $x^2 + cx + 6$ $c = 7, 5$

c. $x^2 + 6x + c$ $c = 8, 5, 9$

d. $x^2 + cx + 12$ $c = 13, 8, 7$

8. Describe the procedure for factoring (so far) in your own words. Note such things as dealing with GCFs, sign of the middle and final terms, factoring powers of a variable.

always first factor out any GCFs
if 4 terms try factor by grouping
for 3 terms - look at sign of last constant if positive need factors that add to middle terms & factors match sign of middle term.
if negative, need factors w/ a difference of middle term, sign of middle term goes on larger factor, change of sign.