MAT 011, GCFs and Grouping (6.1) Name KEY

1. What is the greatest common factor of the set of terms?
   a. $30, 75, 135$ 5
   b. $15, 25, 27$ none or 1
   c. z^7, z^9, z^{11} z^7
   d. $7x^3y^3, -21x^2y^2, 14xy^4$ $7xy^2$

2. Factor out the GCF from each polynomial.
   a. $18a + 12$ $6(3a+2)$
   b. $12x^3 + 16x^2 - 8x$ $4x(3x^2+4x-2)$
   c. $\frac{1}{3}x^4 + \frac{2}{3}x^3 - \frac{4}{3}x^5 + \frac{1}{3}x$ $\frac{1}{3}x(x^3+2x^2-4x^4+1)$
   d. $8(x+2) - y(x+2)$ $(x+2)(8-y)$
   e. $4x - 8y + 2$ $2(2x-4y+1)$
   f. $a^7b^6 - a^3b^3 + a^2b^5 - a^2b^2$ $a^2b^2(a^5b^4 - ab + b^3 - 1)$
   g. $y(x^2+2) + 3(x^2+2)$ $(x^2+2)(y+3)$
   h. $q(b^3-5) + (b^3-5)$ $(b^3-5)(q+1)$

3. Factor a negative GCF from each polynomial.
   a. $-2x - 14$ $-2(x+7)$
   b. $-5y^3 + y^6$ $-y^3(5-y^3)$

4. Factor by grouping.
   a. $x^3 + 4x^2 + 3x + 12$ $x^2(x+4)+3(x+4)$ $(x+4)(x^2+3)$
   b. $8w^2 + 7wv + 8w + 7v$ $w(8w+7v)+1(8w+7v)$ $(8w+7v)(w+1)$
   c. $4y^4 + y^2 + 20y^3 + 5y$ $y^2(4y^2+1)+5y(4y^2+1) = (4y^2+1)(y^2+5y) = y(4y^2+1)(y+5)$
   d. $6x^3 - 4x^2 + 15x - 10$ $2x^2(3x-2)+5(3x-2)$ $(3x-2)(2x^2+5)$
   e. $2x^3 - x^2 - 10x + 5$ $x^2(2x-1)-5(2x-1)$ $(2x-1)(x^2-5)$

5. First factor out any GCFs, then, if possible, factor by grouping.
   a. $32xy - 18x^2$ $2x(16y-9x)$
   d. $z(y-4) + 3(y-4)$ $(y-4)(z+3)$

b. $28x^3 - 7x^2 + 12x - 3$

$7x^2(4x-1) + 3(4x-1)$

$(4x-1)(7x^2+3)$

e. $15x^3 + 5x^2 - 6x - 2$

$5x^2(3x+1) - 2(3x+1)$

$(3x+1)(5x^2-2)$

c. $6a^2 + 9ab^2 + 6ab + 9b^3$

$3(2a^2+3ab^2+2ab+3b^3)$

$3[a(2a+3b^2) + b(2a+3b^2)]$

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

f. $16x^2 + 4xy^2 + 8xy + 2y^3$ $= 2[8x^2+2xy^2+4xy+y^3]$

$4x(4x+y^2) + 2y(4x+y^2)$

$(4x+y^2)(4x+2y)$

$2(4x+y^2)(2x+y)$

6. The number (in millions) of single digital downloads annually in the US during 2004-2010 can be modeled by the polynomial $-20x^2 + 300x + 120$, where x is the number of years since 2004.

a. Find the number of single digital downloads in 2010 (since 2010 is 6 years after 2004 (i.e. $2010 - 2004 = 6$), let $x = 6$ in the equation.

$-20(6)^2 + 300(6) + 120 = 1200$

1,200,000,000 single downloads

b. Use this expression to predict single digital downloads in 2014.

$2014 - 2004 = 10$ $x = 10$

$-20(10)^2 + 300(10) + 120 = 1120$ $\Rightarrow$ 1,120,000,000 single downloads

c. Factor the polynomial $-20x^2 + 300x + 120$ by factoring -20 from each term.

$-20(x^2 - 15x - 6)$