COLLEGE ALGEBRA **MATH 161** **THOMPSON**

Section 1.4 PART 3 FACTOR BY GROUPING

1) FACTOR $6(x+2) + 5a(x+2)$ Factor out the $(x+2)$

$(x+2)(6+5a)$

2) FACTOR $5x(8x^6+9)-4(8x^6+9)$ Factor out the $(8x^6+9)$

$(8x^6+9)(5x-4)$

3) FACTOR $3x^2+4xy + 6x + 8y$ Factor GCF from each highlighted part

$x(3x+4y)+2(3x+4y)$ Factor out the $(3x+4y)$

$(x+2)(3x+4y)$

4) FACTOR $3x^2+3xy - 7x - 7y$ Factor GCF from each highlighted part

$3x(x+y) - 7(x+y)$ Factor out the $(x+y)$

$(x+y)(3x-7)$

5) One side of the equation must be a factored polynomial.
One side of the equation must equal zero.

6) Find real solutions by factoring $x^3 - 36x = 0$

Real solutions means set each factored part =0 and solve

$x(x^2-36)=0$ factor out x first

$x(x+6)(x-6)=0$ factor difference of two squares

$x = 0, x+6=0, x-6=0$

$x = 0,-6,6$

7) Find real solutions by factoring $5x^3 = 2x^2$ move everything to the left

$5x^3 - 2x^2 = 0$ Factor out x^2

$x^2(5x-2)=0$ set each part =0

$x = 0, \frac{2}{5}$

8) Find real solutions by factoring $x^3 - 13x^2 + 42x = 0$

$x(x^2-13x+42)=0$ factor out x first then trinomial

$x(x-7)(x-6)=0$ set each part =0

$x= 0,6,7$

9) Find real solutions by factoring $x^3 - x^2 - x + 1 = 0$

Factor GCF from each highlighted part $x^2(x-1)- 1(x-1)=0$

Factor out the (x-1) $(x^2-1)(x-1)=0$

Factor difference of two squares $(x+1)(x-1)(x-1)=0$

do not duplicate answers $x= -1,1$

10) Find real solutions by factoring $x^3 - 8x^2 - 9x + 72 = 0$

Factor GCF from each highlighted part $x^2(x-8) - 9(x-8)=0$

Factor out the (x-8) $(x^2- 9)(x-8)=0$

Factor difference of two squares $(x+3)(x-3)(x-8)=0$

do not duplicate answers $x= -3,3,8$

11) Find real solutions by factoring $2x^3 + 16 = x^2 + 32x$ move everything to the left

Factor GCF from each highlighted part $2x^3 - x^2 - 32x + 16=0$

Factor out the (6x-5) $x^2(2x - 1)- 16(2x - 1)=0$

$(x^2-16)(2x-1)=0$

Factor difference of two squares $(x+4)(x-4)(2x-1)=0$

$x+4-0 \quad x-4=0 \quad 2x-1=0 \qquad x =-4,4,\frac{1}{2}$

Extra) Find real solutions by factoring $x^3 - 2x^2 + 49x - 98 = 0$

Factor GCF from each highlighted part $x^2(x-2)+49(x-2)=0$

$(x^2+49)(x-2)=0$

$x^2+49= 0$ and $x-2 = 0$

square can never = 0 $x^2 = -49$ *no solution* **x = 2**

Extra) Find real solutions by factoring $6x^3 + 36x = 5x^2 + 30$

move everything to the left

Factor GCF from each highlighted part $6x^3 - 5x^2 - 36x - 30=0$

Factor out the (6x-5) $x^2(6x - 5)- 6(6x - 5)=0$

$(x^2-6)(6x-5)=0$

$x^2-6= 0$ and $6x-5 = 0$ $x=-\sqrt{6}, \sqrt{6}, \frac{5}{6}$