3.2.4: Factoring Fun **(last day's work)**

Determine which type of factoring is needed in each problem and then factor each expression.

Remember that an expression might require more than one factoring strategy in order to be fully factored!

1. $x^3 - 2x^2$

2. $x^3 + 3x^2 - x - 3$

3. $3x^3 - 9x$

4. $3x^3 + x$

5. $-2x^3 + x^2 + 2x - 1$

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

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

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

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

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

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

6. $-2x^3 - 8x$

7. $x^4 - 3x^3$

8. $x^4 - 5x^2 + 4$

9. $x^4 - x^3 - 3x^2 + 3x$

$= x^3(x-1) - 3x(x-1)$

$= (x-1)(x^3 - 3x)$

$= (x-1)x(x^2-3)$

10. $-x^4 + x^3 + 4x^2 - 4x$

11. $-x^4 + 4x^2$

12. $-x^4 + 5x^2 - 4$

$= x(x^3 - x^2 - 3x + 3)$

$= x(x^2(x-1) - 3(x-1))$

$= x(x-1)(x^2-3)$

Answers to 3.2.4: Factoring Fun in random order:

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

Alternate Solution to #5

$-2x^3 + x^2 + 2x - 1$

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

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

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

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

$(-2x+1)(x-1)(x+1)$

Today's Learning Goal(s):

By the end of the class, I will be able to:

a) solve polynomial equations (in standard form), and verify the solutions using technology

3.3.1: Solve & Graph it!

Date: Mar. 22/18

1. Solve

a) $x^3 - x^2 - 2x = 0$

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

$x(x-2)(x+1) = 0$

$\therefore x = 0, 2, -1$

b) $0 = x^3 - 2x^2 - 8x$

c) $0 = x^4 - 1$

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

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

$x = 1, x = -1$ or $x^2 + 1 = 0$

$x^2 = -1$

$x = \pm\sqrt{-1}$

no Real Roots

d) $0 = 3x^2 + 12x + 12$

e) $0 = -x^3 + 2x^2 + 4x - 8$

$= -(x^3 - 2x^2 - 4x + 8)$

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

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

$= -(x-2)(x-2)(x+2)$

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

$\therefore x = 2$ (mult 2) or $x = -2$

f) $-x^4 - 4x^3 - 4x^2 = 0$

g) $6x^3 + 10x^2 + 4x = 0$

h) $0 = x^3 - 7$

$7 = x^3$

$x^3 = 7$

$x = \sqrt[3]{7}$

$\doteq 1.91$

i) $0 = x^4 - 2x^3 - 5x^2 + 6x$

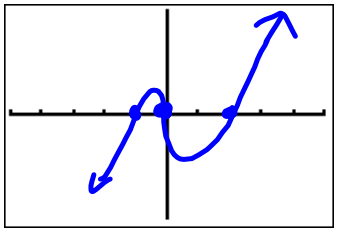
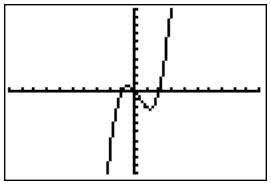
$0 = x(x^3 - 2x^2 - 5x + 6)$

$0 = x(x+2)(x-1)(x-3)$

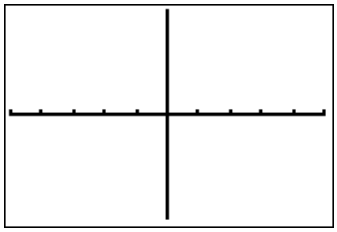
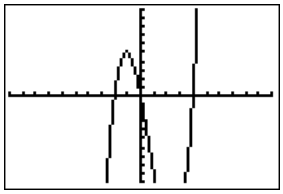
obviously

2. Use your graphing calculator to sketch a graph of the functions below.
   Compare the roots from #1 with the sketches to determine if these roots and x-intercepts match.

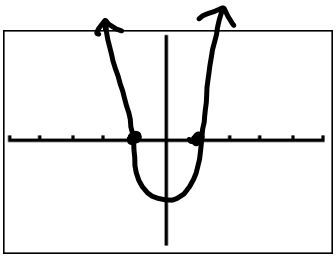
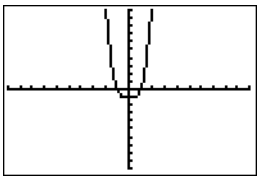
a) $y = x^3 - x^2 - 2x$

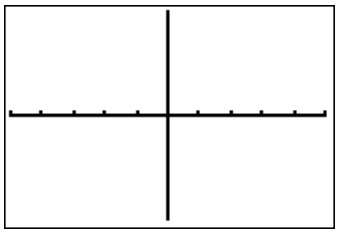
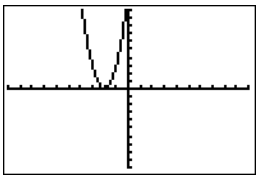
b) $y = x^3 - 2x^2 - 8x$

c) $y = x^4 - 1$

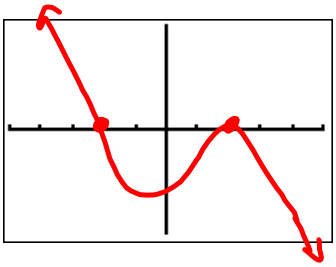
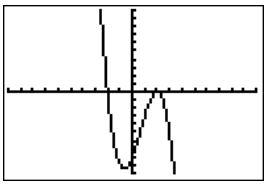



d) $y = 3x^2 + 12x + 12$

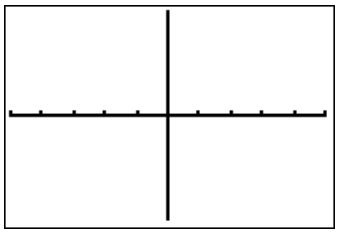
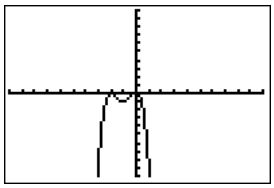



e) $y = -x^3 + 2x^2 + 4x - 8$

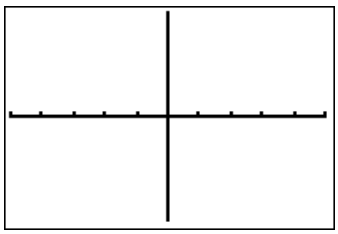
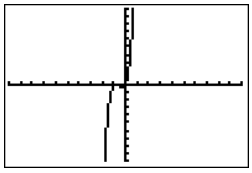
$= -(x-2)^2(x+2)$

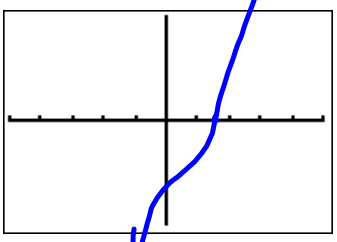
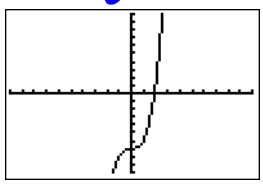
f) $y = -x^4 - 4x^3 - 4x^2$

g) $y = 6x^3 + 10x^2 + 4x$

h) $y = x^3 - 7$

i) $y = x^4 - 2x^3 - 5x^2 + 6x$