FINDING ZEROS OF POLYNOMIAL FUNCTIONS (BY FACTORING AND/OR THE QUADRATIC FORMULA)
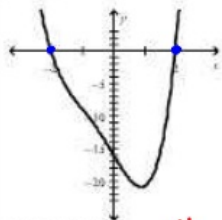
FIND ZEROS BY GRAPHING   **FIND ZEROS ALGEBRAICALLY**

(1a) $y = x^4 + 2x^3 - 8x - 16$

\# of Solutions: __4__

\# of Real Zeros: __2__

\# of Imaginary Zeros: __2__

(1b) $y = (x^4 + 2x^3) - 8x - 16$ (Factoring by Grouping)   *(Merrill p.463)*

$y = x^3(x+2) - 8 \ (x+2)$

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

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

Roots $\left. \begin{matrix} x = -2 \\ x = 2 \end{matrix} \right\}$ mult. of 1 each

$x^2 + 2x + 4 = 0$

$x^2 + 2x + 1 = -4 + 1$

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

$x + 1 = \pm\sqrt{-3}$

$x + 1 = \pm i\sqrt{3}$

$\boxed{x = -1 \pm i\sqrt{3}}$
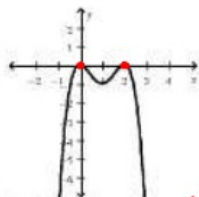
(2a) $f(x) = -x^4 + 4x^3 - 4x^2$

\# of Solutions: __4__

\# of Real Zeros: __4__

\# of Imaginary Zeros: __0__

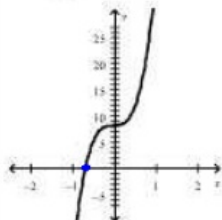**(2b)** $f(x) = -x^4 + 4x^3 - 4x^2$ (GCF)   *(Blitzer, p.293)*

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

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

Roots $x = 0$ (double root $\Rightarrow$ mult. of 2)

$x = 2$ (double root $\Rightarrow$ mult. of 2)

(3a) $p(x) = 27x^3 + 8$

\# of Solutions: __3__

\# of Real Zeros: __1__

\# of Imaginary Zeros: __2__

(3b) $p(x) = 27x^3 + 8$ (Sum of Cubes) $a = 9 \ \ b = -6 \ \ c = 4$

$= (3x + 2)(9x^2 - 6x + 4)$
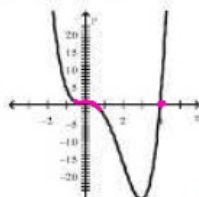
$3x + 2 = 0$

$3x = -2$

$x = -2/3$

Solve by Quad. Formula

$x = \dfrac{6 \pm \sqrt{36 - 4(9)(4)}}{2(9)} = \dfrac{6 \pm \sqrt{-108}}{18}$

$x = \dfrac{6 \pm \sqrt{(-1)\,2\cdot2\cdot3\cdot3\cdot3}}{18}$

$x = \dfrac{6 \pm 6i\sqrt{3}}{18} = \dfrac{6(1 \pm i\sqrt{3})}{4\cdot3}$

$\boxed{x = \dfrac{1 \pm i\sqrt{3}}{3}}$

(4a) $m(x) = x^4 - 4x^3$

\# of Solutions: __4__

\# of Real Zeros: __4__

\# of Imaginary Zeros: __0__

(4b) $m(x) = x^4 - 4x^3$ (GCF)

$= x^3(x - 4)$

Roots $x = 4$ mult of 1

$x = 0$ mult of 3

Name:_____ Date: _____

FINDING ZEROS OF POLYNOMIAL FUNCTION - HOMEWORK

FIND ZEROS BY GRAPHING　　　**FIND ZEROS ALGEBRAICALLY**
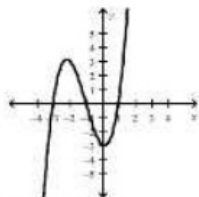
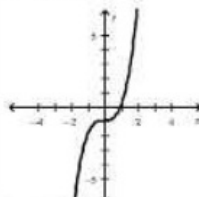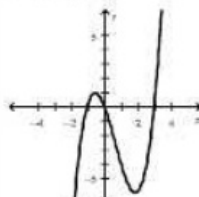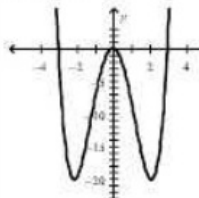|	
(5a) $f(x) = x^3 + 3x^2 - x - 3$ # of Solutions: _____ # of Real Zeros: _____ # of Imaginary Zeros: _____	(5b) $f(x) = x^3 + 3x^2 - x - 3$ (Factoring by Grouping, Hint - Rearrange!)
(6a) $f(x) = x^3 - 1$ # of Solutions: _____ # of Real Zeros: _____ # of Imaginary Zeros:	(6b) $f(x) = x^3 - 1$ (Difference of Cubes)
(7a) $f(x) = x^3 - 2x^2 - 3x$ # of Solutions: _____ # of Real Zeros: _____ # of Imaginary Zeros:	(7b) $f(x) = x^3 - 2x^2 - 3x$ (GCF)　　　*(SOL Coach p.218)*
(8a) $p(x) = x^4 - 9x^2$ # of Solutions: _____ # of Real Zeros: _____ # of Imaginary Zeros: _____	(8b) $p(x) = x^4 - 9x^2$ (GCF)　　　*(Glencoe Book T58)*