

ALGEBRA 2 Review

- ① Use the RATIONAL ZERO TEST to list all possible RATIONAL ZEROS of the function $f(x) = 2x^3 + 2x^2 - 4x - 4$

$$P = \pm 1, \pm 2, \pm 4, \pm \frac{1}{2}$$

- ② Use your calculator, then SYNTHETIC DIVISION AND THEN FACTORING TO DETERMINE WHICH OF THE ABOVE ARE ACTUAL ZEROS.

$$\begin{array}{r|rrrr} -1 & 2 & 2 & -4 & -4 \\ & & -2 & 0 & 4 \\ \hline & 2 & 0 & -4 & 0 \end{array}$$

$2x^2 - 4 = 0$
 $2(x^2 - 2) = 0$

$x = -1, \pm \sqrt{2}$

- ③ Find all RATIONAL ZEROS of the function $f(x) = 4x^3 + 15x^2 - 52x + 12$

$$P = \pm (1, 2, 3, 4, 6, 12, \frac{1}{2}, \frac{3}{2}, \frac{1}{4}, \frac{3}{4})$$

$$\begin{array}{r|rrrr} 2 & 4 & 15 & -52 & 12 \\ & & 8 & 46 & -12 \\ \hline & 4 & 23 & -6 & 0 \end{array}$$

$$x = \frac{-23 \pm \sqrt{529 - 4(4)(-6)}}{8}$$

$$= \frac{-23 \pm \sqrt{625}}{8} = \frac{-23 \pm 25}{8}$$

$x = 2, -6, \frac{1}{4}$

$= -6, \frac{1}{4}$ (factoring)

- ④ Find all REAL ZEROS of the function $f(x) = x^3 + 6x^2 - 6x - 36$

$$\begin{array}{r|rrrr} -6 & 1 & 6 & -6 & -36 \\ & & -6 & 0 & 36 \\ \hline & 1 & 0 & -6 & 0 \end{array}$$

$x = -6, \pm \sqrt{6}$

$x^2 - 6 = 0$
 $x = \pm \sqrt{6}$

- ⑤ Find all ZEROS of the function $f(x) = x^4 - x^3 - 5x^2 - x - 6$

$$\begin{array}{r|rrrrr} -2 & 1 & -1 & -5 & -1 & -6 \\ & & -2 & 6 & -2 & 6 \\ \hline & 1 & -3 & 1 & -3 & 0 \end{array}$$

$x = -2, 3, \pm i$

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

$(x^2 + 1)(x - 3) = 0$
 $x = 3, \pm i$

⑥ Using synthetic division, decide whether the given values of x are zeros of the function (yes or no) show work

a) $f(x) = x^3 - 4x^2 + 9x - 36$ $x = 3i$

$3i \mid$	1	-4	9	-36	
		$3i$	$-9-12i$	36	
	1	$-4+3i$	$-12i$	0	

(yes) show work

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

$-2 \mid$	1	3	1	3	
		-2	-2	2	
	1	1	-1	5	

(No) show work

⑦ Write a polynomial function that has the given zeros and has a leading coefficient of 1

$f(x) = (x+6)(x-4)(x-2)$

$-6 \quad 4 \quad 2$
 $(x+6)(x^2-6x+8)$

or $f(x) = x^3 - 28x + 48$

⑧ Identify the factors of the polynomial function with the zeros

a) $\frac{3}{2}, 3, -3$

b) $\frac{1}{4}, \pm 2i$

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

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

or $(4x-1)(x+2i)(x-2i)$

⑨ Write the polynomial as a product of linear factors

$f(x) = 2x^4 - 7x^3 - 27x^2 + 63x + 81$

$f(x) = (x+3)(x+1)(x-3)(2x-9)$

$-3 \mid$	2	-7	-27	63	81	
		-6	39	-36	-81	

$-1 \mid$	2	-13	12	27	0	
		-2	15	-27		

$3 \mid$	2	-15	27	0	
		6	-27		
	2	-9	0		

$2x - 9 = 0$
 $x = 9/2$