

Name _____

Acc Geometry/ Adv Alg

Date _____ Period _____

11.1 - 11.2 Test Review

List the possible rational roots of the following functions

1) $f(x) = x^2 - 5x + 12$

$\frac{p}{q} = \frac{\pm \{1, 2, 3, 4, 6, 12\}}{\pm 1}$

2) $f(x) = 2x^2 - 5x^3 - 15 + 10x$

$f(x) = -5x^3 + 2x^2 + 10x - 15$

$\frac{p}{q} = \frac{\pm \{1, 3, 5, 15\}}{\pm \{1, 5\}} = \pm \{1, 1/5, 3, 3/5, 5, 15/5\}$

Solve for the zeros of each function using the method of your choice.

3) $f(x) = -x^3 - 5x^2 - 4x - 20$

$-(x^3 + 5x^2) + (4x + 20) = 0$

$x^2(x+5) + 4(x+5)$

$-(x^2+4)(x+5) = 0$

$x = \pm 2i, -5$

4) $f(x) = x^4 - 8x^3 - 38x^2 + 360x - 315$

$$\begin{array}{r|rrrrr} 1 & 1 & -8 & -38 & 360 & -315 \\ & & 1 & -7 & -45 & 315 \\ \hline & 1 & -7 & -45 & 315 & 0 \end{array}$$

$x = 1, 7, \pm 3i\sqrt{5}$

$(x^3 - 7x^2) + 45x + 315 = 0$

$x^2(x-7) - 45(x-7)$

$(x^2 - 45)(x-7) = 0$

5) $f(x) = 14x^3 - 25x^2 - 8x + 4$

$$\begin{array}{r|rrrr} 2 & 14 & -25 & -8 & 4 \\ & & 28 & 6 & -4 \\ \hline & 14 & 3 & -2 & 0 \end{array}$$

$\frac{-28}{3} = -4$

$14x^2 + 3x - 2 = 0$

$x = 2, 1/7, -1/2$

$(14x^2 + 7x)(-4x - 2)$

$7x(2x+1) - 2(2x+1)$

$(7x-2)(2x+1) = 0$

7) $x^3 - 9x^2 + 33x - 25 = 0$

$$\begin{array}{r|rrrr} 1 & 1 & -9 & 33 & -25 \\ & & 1 & -8 & 25 \\ \hline & 1 & -8 & 25 & 0 \end{array}$$

$x^2 - 8x + 25 = 0$

$x^2 - 8x + 16 = -25 + 16$

$\sqrt{(x-4)^2} = \sqrt{-9}$

$x - 4 = \pm 3i$

$x = 4 \pm 3i, 1$

6) $f(x) = -3x^5 + 6x^4 + 18x^3$

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

$x^2 - 2x + 1 = 6 + 1$

$\sqrt{(x-1)^2} = \sqrt{7}$

$x - 1 = \pm \sqrt{7}$

$x = 1 \pm \sqrt{7}, 0 \text{ mult. } 3$

8) $6x^3 - 17x^2 - 27x - 4 = 0$

$$\begin{array}{r|rrrr} -1 & 6 & -17 & -27 & -4 \\ & & -6 & 23 & 4 \\ \hline & 6 & -23 & -4 & 0 \end{array}$$

$\frac{-24}{-23} = 1$

$6x^2 - 23x - 4 = 0$

$(6x^2 - 24x) + (1x - 4)$

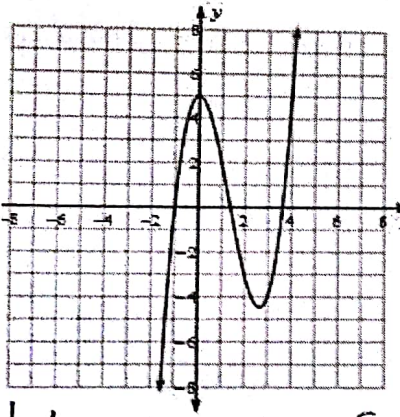
$6x(x-4) + 1(x-4)$

$(6x+1)(x-4) = 0$

$x = -1/6, 4, -1$

9)

$$f(x) = x^3 - 4x^2 + 5$$



$$\begin{array}{r|rrrr} -1 & 1 & -4 & 0 & 5 \\ & \downarrow & -1 & 5 & -5 \\ \hline & 1 & -5 & 5 & 0 \end{array}$$

$$x^2 - 5x + 5 = 0$$

$$x = \frac{5 \pm \sqrt{25 - 4(1)(5)}}{2(1)}$$

$$= \left[\frac{5 \pm \sqrt{5}}{2}, -1 \right]$$

10) $x^5 + x^4 - 7x^3 - 7x^2 - 18x - 18 = 0$

$$\begin{array}{r|rrrrrr} -1 & 1 & 1 & -7 & -7 & -18 & -18 \\ & \downarrow & -1 & 0 & 7 & 0 & 18 \\ \hline & 1 & 0 & -7 & 0 & -18 & 0 \end{array}$$

$$x^4 - 7x^2 - 18 = 0$$

$$(x^2 - 9)(x^2 + 2) = 0$$

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

$$x = \pm 3, \pm i\sqrt{2}, -1$$

11) $3x^5 + 21x^3 = 54x$

$$3x^5 + 21x^3 - 54x = 0$$

$$3x(x^4 + 7x^2 - 18) = 0$$

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

$$x = 0, \pm 3i, \pm \sqrt{2}$$

12) $3x^5 - x^4 - 2x^3 = 0$

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

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

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

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

$$x = -2/3, 1, 0 \text{ mult. of } 3$$

Write a polynomial function with the given zeros.

13) $2 + 4i, \frac{1}{3}$

$$x = 2 + 4i \quad x = 1/3$$

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

$$x^2 - 4x + 4 = 16i^2$$

$$(x^2 - 4x + 20)(3x - 1) = 0$$

3x	3x ³	-12x ²	60x
-1	-x ²	4x	-20

$$3x^3 - 13x^2 + 64x - 20 = 0$$

14) 0 (mult of 4), $3\sqrt{5}, -3i$

$$x^4 \quad x^2 = (3\sqrt{5})^2$$

$$x^2 = 45$$

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

$$x^2 = -9i^2$$

$$x^4(x^2 - 45)(x^2 + 9) = 0$$

$$x^4(x^4 - 36x^2 - 405) = 0$$

$$x^8 - 36x^6 - 405x^4 = 0$$