

Review- Polynomial Division & Finding Roots

Date _____ Period _____

Divide using long division.

1) $(-5x^3 + 41x^2 - 16x + 60) \div (x - 8)$

$$-5x^2 + x - 8 - \frac{4}{x - 8}$$

2) $(4m^2 + 4m - 23) \div (m + 3)$

$$4m - 8 + \frac{1}{m + 3}$$

Divide using synthetic division.

3) $(x^3 + x^2 - 85x + 55) \div (x + 10)$

$$x^2 - 9x + 5 + \frac{5}{x + 10}$$

Given one factor, find the other factors.

5) $f(x) = x^3 - x^2 - 25x + 25; x - 5$

$$f(x) = (x + 5)(x - 1)(x - 5)$$

6) $f(x) = x^3 - 19x + 30; x - 3$

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

Given one zero, find the zeros.

7) $f(x) = x^3 - 11x^2 + 23x + 35; 5$

$$\{7, -1, 5\}$$

Given two roots, find the other roots.

8) $f(x) = x^4 - 3x^3 - 6x^2 - 12x - 40; \text{ roots: } -2, 5$

$$\{2i, -2i\}$$

$$7r^4 - 70r^3 + 0r^2 + 3r - 35$$

$$4) (7r^4 - 70r^3 + 3r - 35) \div (r - 10) = 0$$

$$7r^3 + 3 - \frac{5}{r - 10}$$

$$r = 10$$

10	7	-70	0	3	-35
	↓	70	0	0	35
	7	0	0	3	-5

State the possible rational zeros for each function.

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

$\pm 1, \pm \frac{1}{3}$

10) $f(x) = 3x^3 + 14x^2 + 9x - 18$

$\pm 1, \pm 2, \pm 3, \pm 6, \pm 9, \pm 18, \pm \frac{1}{3}, \pm \frac{2}{3}$

Find all zeros.

11) $f(x) = x^3 - 5x^2 + 7x - 3$

$\{3, 1 \text{ mult. } 2\}$

$\rightarrow 1$ with multiplicity of 2 (twice)

12) $f(x) = x^3 - 6x^2 + 9x + 50$

$\{-2, 4 + 3i, 4 - 3i\}$

Calc: $-2 \quad -2$

	1	-6	9	50
		-2	16	-50
	1	-8	25	0

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

$x = \frac{8 \pm \sqrt{(-8)^2 - 4(1)(25)}}{2(1)}$

$\frac{8 \pm \sqrt{-36}}{2} = \frac{8 \pm 6i}{2} = \cancel{4 \pm 3i}$

13) $f(x) = x^3 - 27$

$\left\{3, \frac{-3 + 3i\sqrt{3}}{2}, \frac{-3 - 3i\sqrt{3}}{2}\right\}$

14) $f(x) = 2x^4 - 11x^2 + 9$

$\left\{1, -1, \frac{3\sqrt{2}}{2}, -\frac{3\sqrt{2}}{2}\right\}$

$(2x^2 - 9)(x^2 - 1)$
 $(2x^2 - 9)(x+1)(x-1)$

$2x^2 - 9 = 0$

$\sqrt{2x^2} = \sqrt{9}$

$\frac{\sqrt{2}x}{\sqrt{2}} = \frac{3}{\sqrt{2}}$

$x = \pm \frac{3\sqrt{2}}{2}$

$x = -1$

$x = 1$

$x = \pm \frac{3\sqrt{2}}{2}$