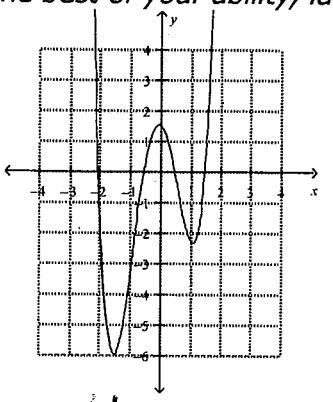
KEY 2019-20

Unit 2 - Polynomials and Polynomial Functions 90% of Test

Unit 1– 10% of Test

To the best of your ability, identify the degree and describe the roots.

1.



Degree: 4 Even

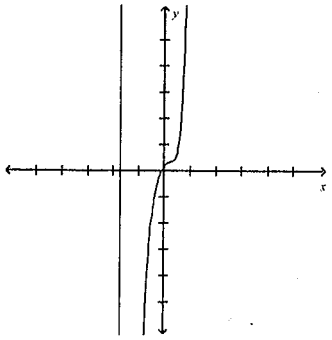
Total # of roots: 4

# of real roots: 4

# of imaginary roots: 0

Factors: $(x+2)(x-5)(x+.5)(x-1.5)$

2.



Degree: 4 EVEN

Total # of roots: 4

# of real roots: 4

# of imaginary roots: 0

Factors: $x^3(x+2.75)$

Polynomial Operations – Long Division and Remainder Theorem

3. Use polynomial long division to simplify each of the following ratios. There should be a zero remainder.

(a) $\frac{x^2+5x-24}{x-3}$

$$x-3 \overline{)\, x^2+5x-24}$$

$x+8$

$-x^2+3x$

$8x-24$

$-8x+24$

0

$x+8$

(b) $\frac{6x^2+11x-10}{3x-2}$

$$3x-2 \overline{)\, 6x^2+11x-10}$$

$2x+5$

$-6x^2+4x$

$15x-10$

$-15x+10$

0

$2x+5$

4. Use polynomial long division to write each of the following ratios in $q(x)+\frac{r}{x-a}$ form, where $q(x)$ is a polynomial and r is the remainder.

(c) $\frac{x^2-6x+11}{x-4}$

$$x-4 \overline{)\, x^2-6x+11}$$
$$x-2$$
$$-x^2+4x \downarrow$$
$$-2x+11$$
$$+2x-8$$
$$3$$

$x-2+\frac{3}{x-4}$

(d) $\frac{x^2+2x-25}{x+7}$

$$x+7 \overline{)\, x^2+2x-25}$$
$$x-5$$
$$-x^2-7x \downarrow$$
$$-5x-25$$
$$+5x+35$$
$$10$$

$x-5+\frac{10}{x+7}$

5. Is (x + 4) a factor of $x^4 - 6x^3 + 3x^2 + 26x - 24$? How do you know?

$x = -4$ $\quad (-4)^4-6(-4)^3+3(-4)^2+26(-4)-24=560$

Not a factor, remainder must be 0.

6. Which of the following linear expressions is a factor of the cubic polynomial $x^3+9x^2+16x-12$?

(1) $x+6$ (3) $x-3$

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

Plug in to equation

1

Polynomials and Linear Factors

Write each expression as a polynomial in standard form.

7. $x(x-4)^2$

$x(x-4)(x-4)$

$x(x^2-8x+16)$

x^3-8x^2+16x

8. $(x+3)(x-6)(x+2)$

$x^3-x^2-24x-36$

Write a polynomial function in standard form with the given zeros.

9. x = -2, 0, 4

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

x^3-2x^2-8x

10. x = -4, 1, 1

x^3+2x^2-7x+4

End Behavior of Polynomials

Find the right-hand and left-hand behavior of the graph of the polynomial function.

11. $f(x) = -x^4 + 6x^2 + 4$

$x \to -\infty \quad y \to -\infty$

$x \to \infty \quad y \to -\infty$

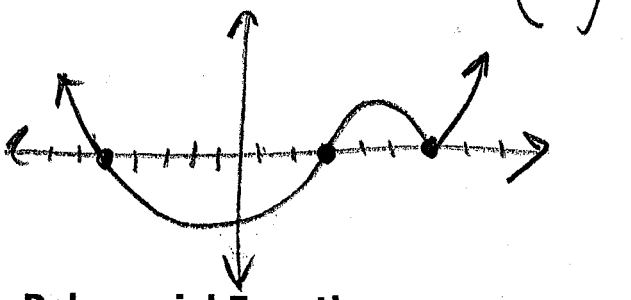
12. $f(x) = -x^3 + 3x^2 - 5$

$x \to -\infty \quad y \to \infty$

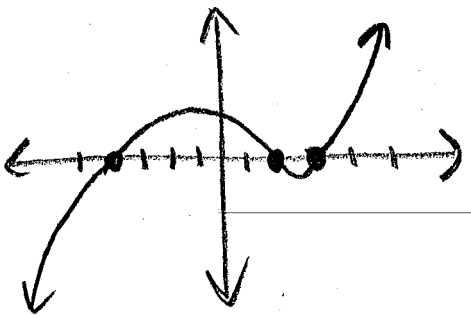
$x \to \infty \quad y \to -\infty$

Sketch the general shape of each function.

13. $f(x) = (x - 3)(x + 4)(x - 6)^2$



14. $f(x) = (x - 2)(x+4)(x - 3)$

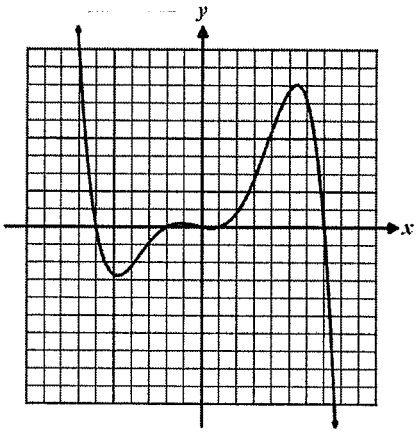


Polynomial Equations

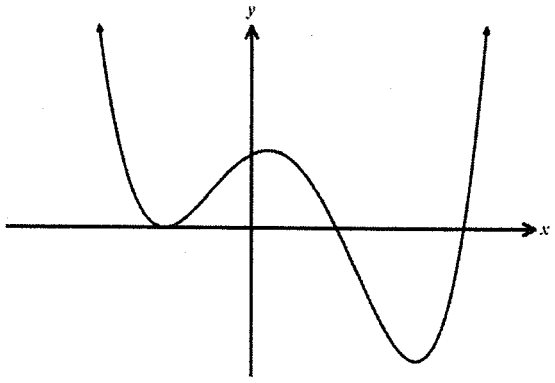
15 Given the following graph, state the factors and explain your reasoning:

$x(x+6)(x+2)(x-1)(x-7)$

Zeroes = $0, -6, -2, 1, 7$



16 Given the following graph, explain what you know about the end behavior and degree:



Even degree

Positive a value

17.

Create the equation of the cubic, in standard form, that has x-intercepts of -4, 2, and 5 and passes through the point $(6, 20)$. Verify your answer by sketching the cubic's graph on the axes below.

$y = a(x+4)(x-2)(x-5)$

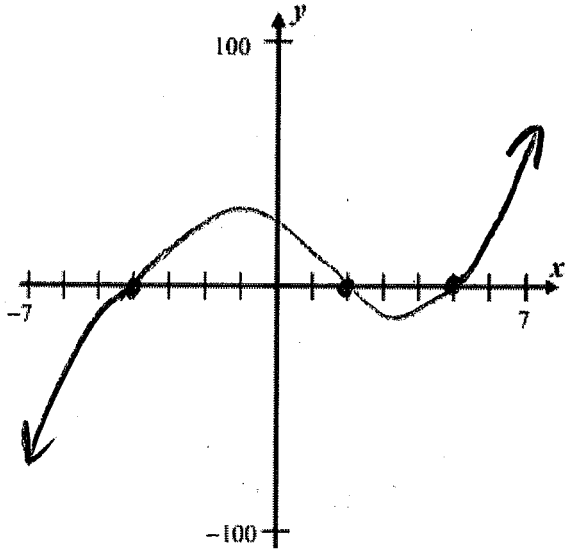
$20 = a(6+4)(6-2)(6-5)$

$20 = 40a$

$\frac{1}{2} = a$

$y = \frac{1}{2}(x+4)(x-2)(x-5)$

$y = \frac{1}{2}x^3 - \frac{3}{2}x^2 - 9x + 20$



18.

Create an equation for a cubic function, in standard form, that has x-intercepts given by the set $\{-3, 1, 7\}$ and which passes through the point $(-2, 54)$. Sketch your result on the axes shown below.

$y = a(x+3)(x-1)(x-7)$

$2 = a$

$y = 2x^3 - 10x^2 - 34x + 42$