

## Study Guide for Quiz on Polynomial Functions

**Learning Target 1:** Classifying and describing polynomial functions from their end behavior.

**Directions:** For each of the equations, write them in standard form, classify the degree of polynomial, and describe its end behavior (3 points each)

1.)  $f(x) = 10x + x^5 - 5x^2$

Standard Form:  $f(x) = x^5 - 5x^2 + 10x$

Classification: 5th degree trinomialEnd Behavior: up and down

2.)  $f(x) = 3x^2 + 9x^4 - 2x^3 + 10$

Standard Form:  $f(x) = 9x^4 - 2x^3 + 3x^2 + 10$

Classification: 4th degree polynomialEnd Behavior: up and up

3.)  $f(x) = 2x^2 - 4x^3 - 5x + 10x^2$

Standard Form:  $f(x) = -4x^3 + 12x^2 - 5x$

Classification: 3rd degree trinomialEnd Behavior: down and up

4.)  $f(x) = (x + 10)(x - 6)$   $x^2 - 6x + 10x - 60$

Standard Form:  $f(x) = x^2 + 4x - 60$

Classification: quadratic (2nd degree)End Behavior: up and up

**Learning Target 2:** Solve Polynomials by graphing

**Directions:** Solve each of the polynomials using graphing. (3 points each)

5.)  $y = x^3 + 2x^2 - 8x$

$x = -4$

$x = 0$

$x = 2$

6.)  $y = x^4 + 10x^2 - 25$

$x = -1.5$

$x = 1.5$

7.)  $y = x^5 + 10x^4 - 15x^3 - 5x$

$x = 0$

$x = 1.5$

8.)  $y = 3x^2 + 10x^2 - 18$

$x = 1.8$

$x = -1.8$

9.)  $y = 2x^3 + 6x^2 - 4$

$x = -2.7$

$x = -1$

$x = 0.7$

10.)  $y = 2x^6 + 6x^4 - 4x^2$

$x = -0.75$

$x = 0$

$x = 0.75$

**Learning Target 3: Solve Polynomials by Factoring****Directions:** Find all the solutions of each equation by factoring (4 points each)

11.)  $2x^3 + 10x^2 + 8x = 0$

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

$\begin{array}{r} \phantom{2x} \\ \phantom{2x} \phantom{+} \\ \phantom{2x} \phantom{+} \phantom{4} \\ \phantom{2x} \phantom{+} \phantom{4} \phantom{1} \\ \phantom{2x} \phantom{+} \phantom{4} \phantom{1} \phantom{1} \end{array}$

$$2x(x+4)(x+1) = 0$$

$$2x = 0 \quad x+4 = 0 \quad x+1 = 0$$

$$x = 0 \quad x = -4 \quad x = -1$$

12.)  $4x^3 - 12x^2 = 16x$

$$4x^3 - 12x^2 - 16x = 0$$

$$4x(x^2 - 3x - 4) = 0$$

$\begin{array}{r} \phantom{4x} \\ \phantom{4x} \phantom{-} \\ \phantom{4x} \phantom{-} \phantom{4} \\ \phantom{4x} \phantom{-} \phantom{4} \phantom{1} \\ \phantom{4x} \phantom{-} \phantom{4} \phantom{1} \phantom{1} \end{array}$

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

$$4x = 0 \quad x-4 = 0 \quad x+1 = 0$$

$$x = 0 \quad x = 4 \quad x = -1$$

13.)  $9x^3 - 18x^2 = 27x$

$$9x^3 - 18x^2 - 27x = 0$$

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

$\begin{array}{r} \phantom{9x} \\ \phantom{9x} \phantom{-} \\ \phantom{9x} \phantom{-} \phantom{3} \\ \phantom{9x} \phantom{-} \phantom{3} \phantom{1} \\ \phantom{9x} \phantom{-} \phantom{3} \phantom{1} \phantom{1} \end{array}$

$$9x(x-3)(x+1) = 0$$

$$9x = 0 \quad x-3 = 0 \quad x+1 = 0$$

$$x = 0 \quad x = 3 \quad x = -1$$

14.)  $(4x^3 + 12x^2) + 3x + 9 = 0$

$$4x^2(x+3) + 3(x+3) = 0$$

$$(4x^2 + 3)(x+3) = 0$$

$$4x^2 + 3 = 0 \quad x+3 = 0$$

$\begin{array}{r} \phantom{4x^2} \\ \phantom{4x^2} \phantom{+} \\ \phantom{4x^2} \phantom{+} \phantom{3} \\ \phantom{4x^2} \phantom{+} \phantom{3} \phantom{1} \\ \phantom{4x^2} \phantom{+} \phantom{3} \phantom{1} \phantom{1} \end{array}$

$$x = -3$$

$$\frac{4x^2}{4} = \frac{-3}{4}$$

$$\sqrt{x^2} = \sqrt{\frac{-3}{4}}$$

$$x = \sqrt{\frac{-3}{4}}$$

$$x = \pm \sqrt{\frac{3}{4}}$$

15.)  $(5x^3 - 15x^2) + 4x - 12 = 0$

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

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

$$5x^2 + 4 = 0$$

$\begin{array}{r} \phantom{5x^2} \\ \phantom{5x^2} \phantom{+} \\ \phantom{5x^2} \phantom{+} \phantom{4} \\ \phantom{5x^2} \phantom{+} \phantom{4} \phantom{1} \\ \phantom{5x^2} \phantom{+} \phantom{4} \phantom{1} \phantom{1} \end{array}$

$$\frac{5x^2}{5} = \frac{-4}{5}$$

$$\sqrt{x^2} = \sqrt{\frac{-4}{5}}$$

$$x = \pm \sqrt{\frac{4}{5}}$$

$$x-3 = 0$$

$$x = 3$$

16.)  $7x^3 - 21x^2 = 5x - 15$

$$7x^3 - 21x^2 - 5x + 15 = 0$$

$$7x^2(x-3) - 5(x-3) = 0$$

$$(7x^2 - 5)(x-3) = 0$$

$$7x^2 - 5 = 0$$

$\begin{array}{r} \phantom{7x^2} \\ \phantom{7x^2} \phantom{-} \\ \phantom{7x^2} \phantom{-} \phantom{5} \\ \phantom{7x^2} \phantom{-} \phantom{5} \phantom{1} \\ \phantom{7x^2} \phantom{-} \phantom{5} \phantom{1} \phantom{1} \end{array}$

$$\frac{7x^2}{7} = \frac{5}{7}$$

$$\sqrt{x^2} = \sqrt{\frac{5}{7}}$$

$$x = \sqrt{\frac{5}{7}}$$

$$x-3 = 0$$

$$x = 3$$