Algebra 2 Graphing Polynomials Review KEY

SHOW ALL WORK on the worksheet

State the end behavior for each of the following polynomial functions.

1. $f(x) = 5x^3 - 2x + 9$

$x \to \infty,\ f(x) \to \infty$

$x \to -\infty,\ f(x) \to \infty$

2. $g(x) = -x^{100} + 4x^6 - 3x + 8$

$x \to \infty,\ g(x) \to -\infty$

$x \to -\infty,\ g(x) \to -\infty$

3. $y = -x^9 + x^8 - 2x^5 + 10$

$x \to \infty,\ y \to -\infty$

$x \to -\infty,\ y \to \infty$

4. $k(x) = x^8 - 4x^2 - 7x^{15}$

$x \to \infty,\ k(x) \to \infty$

$x \to -\infty,\ k(x) \to \infty$

5. $f(x) = (x+3)(2x-5)(x+6)$

$k = 2$ deg = 3

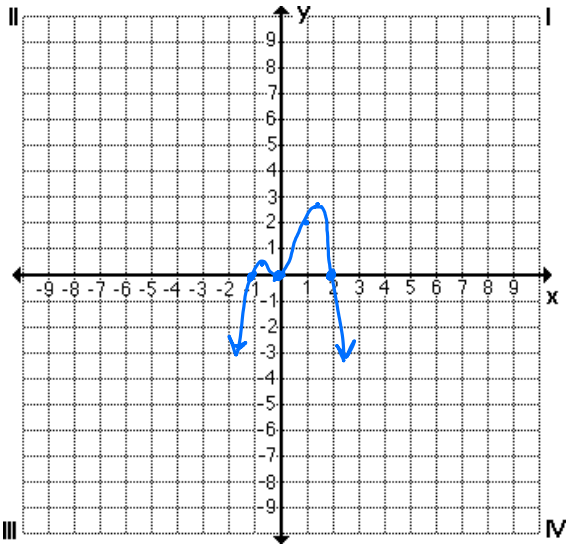
$x \to \infty,\ f(x) \to \infty$

$x \to -\infty,\ f(x) \to -\infty$

Graph the following polynomial functions and state the key characteristics listed below.

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

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



End behavior: $x \to \infty,\ y \to -\infty$; $x \to -\infty,\ y \to -\infty$

x-intercept(s): $-1,\ 0,\ 2$

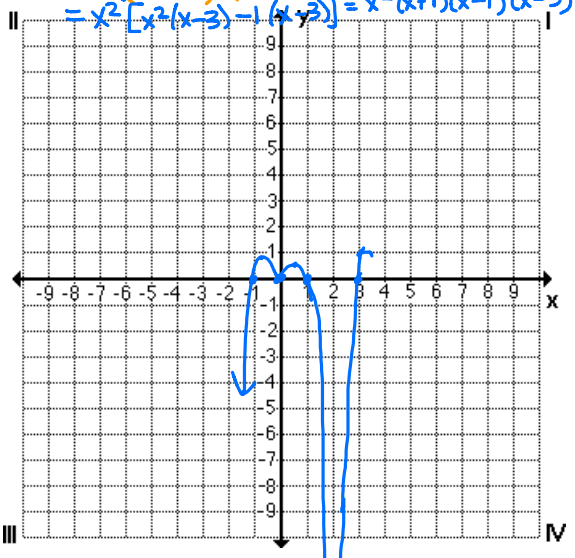
y-intercept(s): 0

Domain: $\mathbb{R}$

Range: $(-\infty, 2.8]$

7. $y = x^5 - 3x^4 - x^3 + 3x^2$

$= x^2(x^3 - 3x^2 - (x+3)) = x^2[x^2(x-3) - 1(x+3)] = x^2(x+1)(x-1)(x-3)$



End behavior: $x \to \infty,\ y \to \infty$; $x \to -\infty,\ y \to -\infty$

x-intercept(s): $-1, 0, 1, 3$

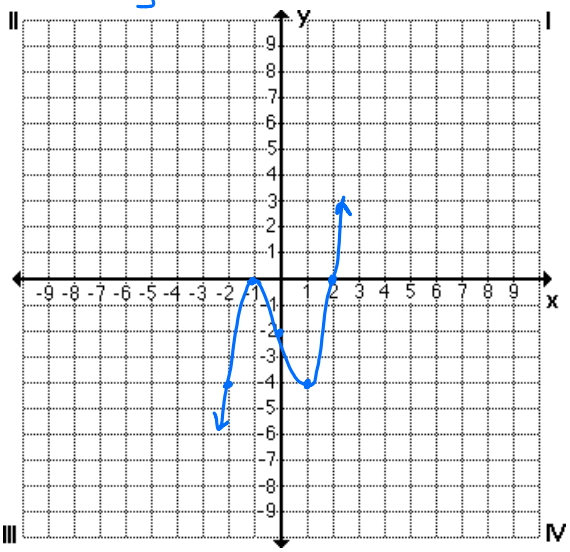
y-intercept(s): 0

Domain: $\mathbb{R}$

Range: $\mathbb{R}$

8. $y=(x-2)(x+1)^2$

deg = 3 lc = 1



End behavior: $x\to\infty, y\to\infty$
$x\to-\infty, y\to-\infty$

x-intercept(s): $-1, 2$

y-intercept(s): -2

Domain: $\mathbb{R}$

Range: $\mathbb{R}$

Find all zeros of the following polynomial functions.

8. $f(x)=x^3-8x^2+11x+20$

Poss: $\pm1, \pm2, \pm4, \pm5, \pm10, \pm20$ (1 20, 2 10, 4 5)

$$\begin{array}{r|rrrr} -1 & 1 & -8 & 11 & 20 \\ & & -1 & 9 & -20 \\ \hline & 1 & -9 & 20 & 0 \end{array}$$

$f(x)=(x+1)(x^2-9x+20)$

$0=(x+1)(x-5)(x-4)$

$x=-1, 5, 4$

9. $g(x)=x^5-2x^4+8x^2-13x+6$

Poss: $\pm1, \pm2, \pm3, \pm6$ (1 6, 2 3)

$$\begin{array}{r|rrrrrr} -2 & 1 & -2 & 0 & 8 & -13 & 6 \\ & & -2 & 8 & -16 & 16 & -6 \\ \hline & 1 & -4 & 8 & -8 & 3 & 0 \end{array}$$

$g(x)=(x+2)(x^4-4x^3+8x^2-8x+3)$

$$\begin{array}{r|rrrrr} 1 & 1 & -4 & 8 & -8 & 3 \\ & & 1 & -3 & 5 & -3 \\ \hline & 1 & -3 & 5 & -3 & 0 \end{array}$$

$g(x)=(x+2)(x-1)(x^3-3x^2+5x-3)$

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

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

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

10. Write an equation in standard form that would have each of the following sets of roots:

(a) x=-1, x=2, x=-3

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

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

$=x^3+3x^2-x^2-3x-2x-6$

$=x^3+2x^2-5x-6$

(b) x=2, x=-2, $x=-\frac{5}{2}$

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

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

$=2x^3+5x^2-8x-20$