5.3 Practice –Polynomial Graphs

Solutions

Pre-Calculus

For 1-3, determine the possible numbers of positive and negative real zeros.

1. $f(x) = 5x^4 + 17x^2 - 12$

$f(-x) = 5x^4 + 17x^2 - 12$

Positive Zeros: 1 or 0

Negative Zeros: 1 or 0

2. $h(x) = 5x^6 + 2x^3 - 36x - 9$

$h(-x) = 5x^6 - 2x^3 + 36x - 9$

Positive Zeros: 1 or 0

Negative Zeros: 3, 1, or 0

3. $f(x) = x^3 - 7x^2 - x + 15$

$f(-x) = -x^3 - 7x^2 + x + 15$

Positive Zeros: 2 or 0

Negative Zeros: 1 or 0

Skills Review: Find the x- and y-intercepts for each function. SHOW ALL WORK!

1. $x = 4y + 56$

x-int:

$x = 4(0) + 56$

$x = 56$

y-int:

$0 = 4y + 56$

$-56 = 4y$

$y = -14$

2. $f(x) = \frac{x^2-3x+2}{x^2-9}$

x-int:

$0 = \frac{x^2-3x+2}{x^2-9}$

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

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

$x = 2, 1$

y-int:

$y = \frac{0-0+2}{0-9}$

$y = -\frac{2}{9}$

5.3 Practice –Polynomial Graphs (continued)

Name: _____

Pre-Calculus

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

   a. How does the graph behave with relation to the x-axis at $x = 3$? tangent

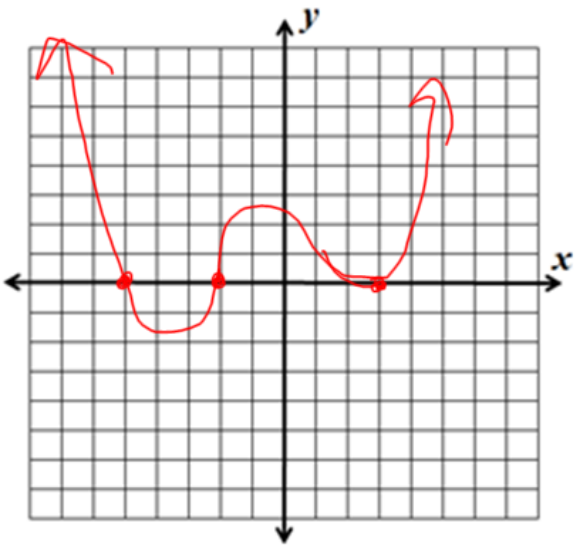
   b. What are the real zeros of the function? $-2, 3, -5$

   c. What is the degree of the function? 4

   d. Describe the end behavior using limit notation.

   $\lim_{x\to-\infty} f(x) = \infty$ $\lim_{x\to\infty} f(x) = \infty$

   e. Sketch a possible graph



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

   a. How does the graph behave with relation to the x-axis at $x = 4$? crosses

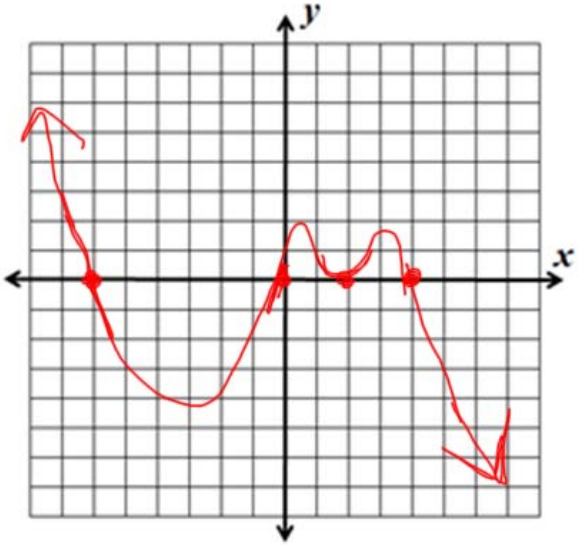
   b. What are the real zeros of the function? $0, -6, 4, 2$

   c. What is the degree of the function? 9

   d. Describe the end behavior using limit notation.

   $\lim_{x\to-\infty} f(x) = \infty$ $\lim_{x\to\infty} f(x) = -\infty$

   e. Sketch a possible graph



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

   a. How does the graph behave with relation to the x-axis at $x = 6$? tangent

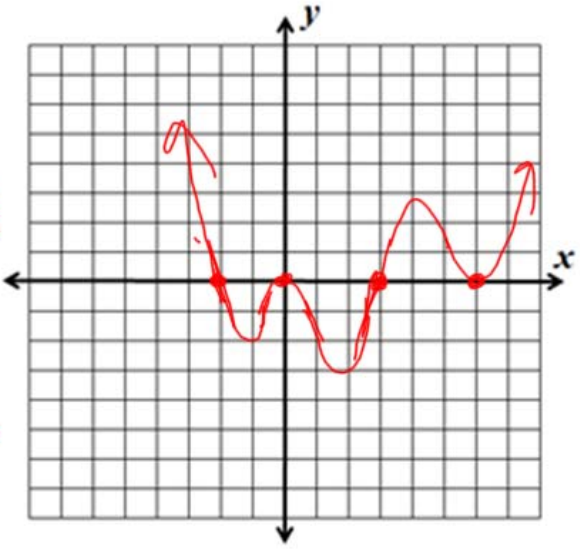
   b. What are the real zeros of the function? $0, -2, 6, 3$

   c. What is the degree of the function? 12

   d. Describe the end behavior using limit notation.

   $\lim_{x\to-\infty} f(x) = \infty$ $\lim_{x\to\infty} f(x) = \infty$

   e. Sketch a possible graph

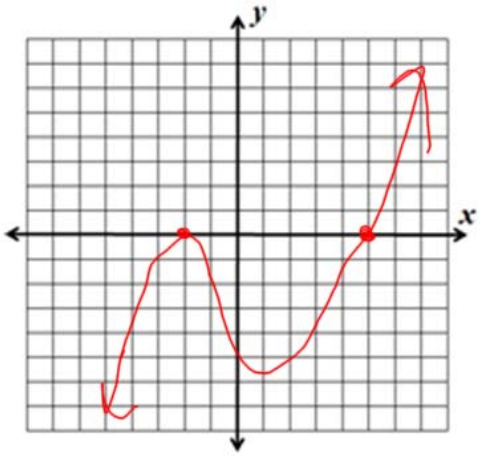


7. Factor the function $f(x) = 3x^3 - 3x^2 - 48x - 60$ and sketch the graph if $f(-2) = 0$.

$$\begin{array}{c|cccc} -2 & 3 & -3 & -48 & -60 \\ & & -6 & 18 & 60 \\ \hline & 3 & -9 & -30 & 0 \end{array}$$

$3(x^2 - 3x - 10)(x+2)$

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



8. Factor the function $f(x) = 3x^6 + 4x^5 - 42x^4 - 36x^3 + 135x^2$ and sketch the graph if $f(-3) = 0$.

$$\begin{array}{c|ccccccc} -3 & 3 & 4 & -42 & -36 & 135 & 0 & 0 \\ & & -9 & 15 & 81 & -135 & 0 & 0 \\ \hline & 3 & -5 & -27 & 45 & 0 & 0 & 0 \end{array}$$

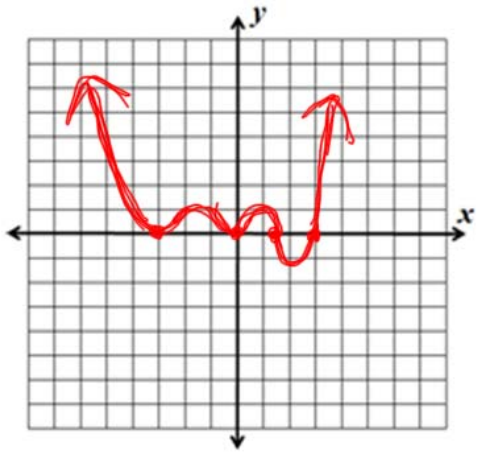
$(3x^5 - 5x^4 - 27x^3 + 45x^2)(x+3)$

$x^2(3x^3 - 5x^2 - 27x + 45)(x+3)$

$x^2(x^2(3x-5) - 9(3x-5))(x+3)$

$x^2(x^2-9)(3x-5)(x+3)$

$x^2(x-3)(3x-5)(x+3)^2$



9. Given the graph of $g(x)$ on the right, identify the following:

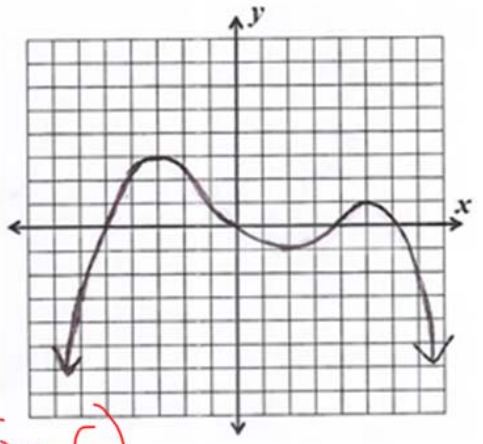
a. Local minimum value(s) -1

b. Local maximum value(s) $1, 3$

c. Minimum Degree 4

d. Write out a possible function. Leave it in factored form.

$g(x) = -(x+5)(x)(x-4)(x-6)$



10. Given the graph of $g(x)$ on the right, identify the following:

a. Local minimum value(s) 0

b. Local maximum value(s) $2, 3$

c. Minimum Degree 5

d. Write out a possible function. Leave it in factored form.

$g(x) = -(x+4)^2(x-1)^2(x-6)$