



# 1.5 Identify Zeros, End Behavior, and Graphing

2023-2024

SCORE: /

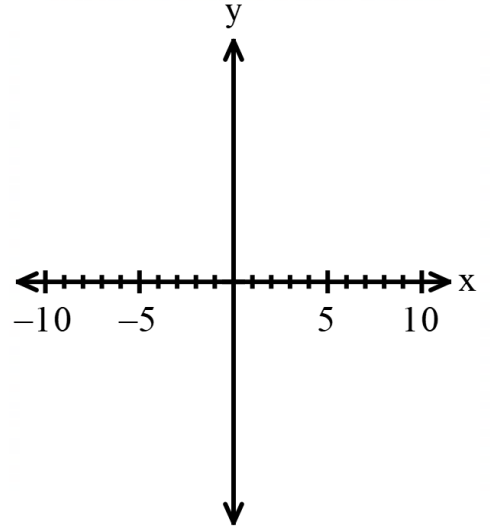
Name \_\_\_\_\_ Date \_\_\_\_\_ Period \_\_\_\_\_

Without using technology, sketch each polynomial. (Hint: State the degree, identify the zeros, their multiplicity, determine whether they touch or cross the x-axis at each zero and describe their end behavior.)

1.  $f(x) = (x + 1)(x - 1)(x - 3)$  Degree: \_\_\_\_\_

Zeros	Multiplicity	Touch/Cross

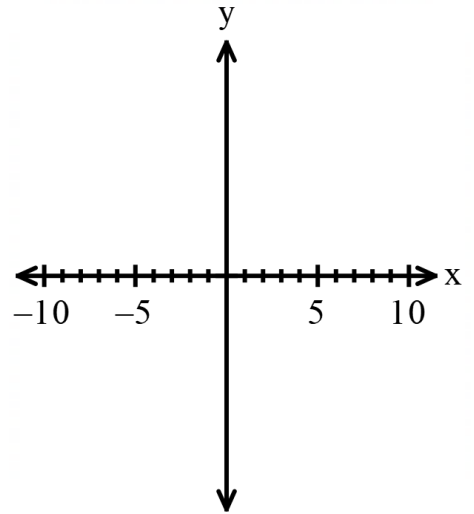
$\lim_{x \rightarrow \infty} f(x) =$        $\lim_{x \rightarrow -\infty} f(x) =$



2.  $f(x) = -x^2(x + 3)(5x - 4)$  Degree: \_\_\_\_\_

Zeros	Multiplicity	Touch/Cross

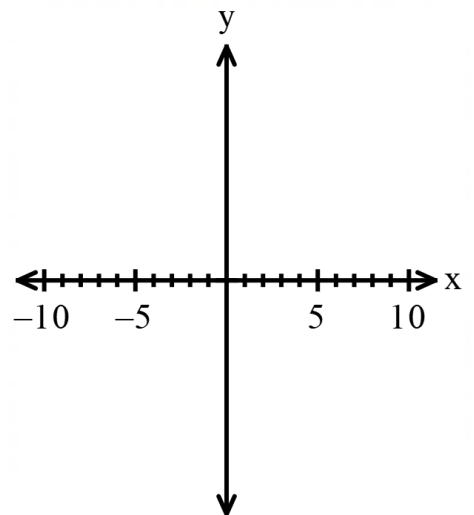
$\lim_{x \rightarrow \infty} f(x) =$        $\lim_{x \rightarrow -\infty} f(x) =$



3.  $f(x) = (x + 4)(x + 1)(x - 2)(x - 3)$  Degree: \_\_\_\_\_

Zeros	Multiplicity	Touch/Cross

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

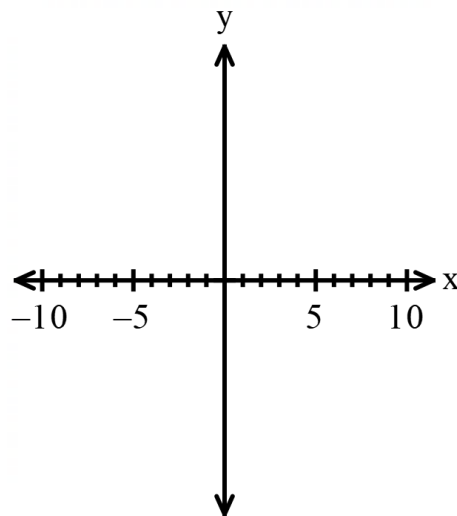


4.  $f(x) = -(x + 1)(x - 3)^2$  Degree: \_\_\_\_\_

Zeros	Multiplicity	Touch/Cross

$\lim_{x \rightarrow \infty} f(x) =$

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

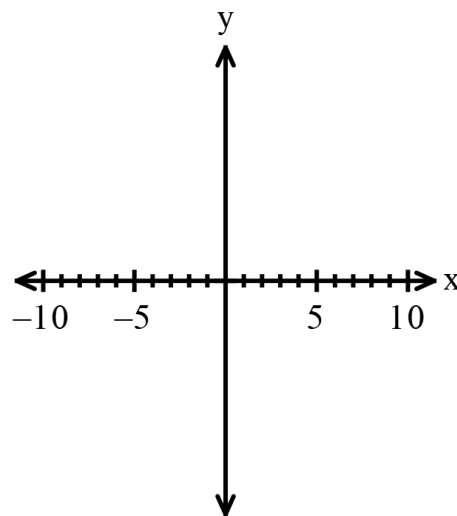


5.  $f(x) = (x - 1)^3(x + 2)^2$  Degree: \_\_\_\_\_

Zeros	Multiplicity	Touch/Cross

$\lim_{x \rightarrow \infty} f(x) =$

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

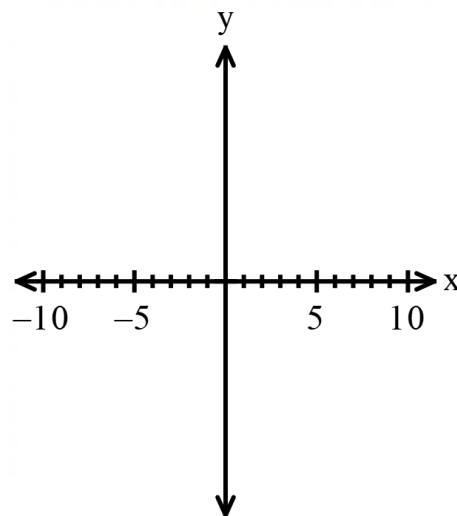


6.  $f(x) = -(x - 2)^3(x + 1)$  Degree: \_\_\_\_\_

Zeros	Multiplicity	Touch/Cross

$\lim_{x \rightarrow \infty} f(x) =$

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



Match the polynomial function with its graph (without a graphing calculator!). Explain your choice.

7.  $f(x) = 7x^3 - 21x^2 - 91x + 104$

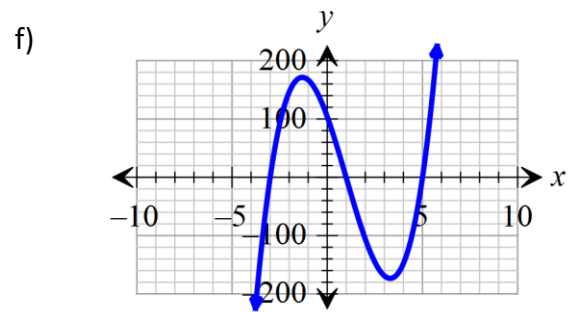
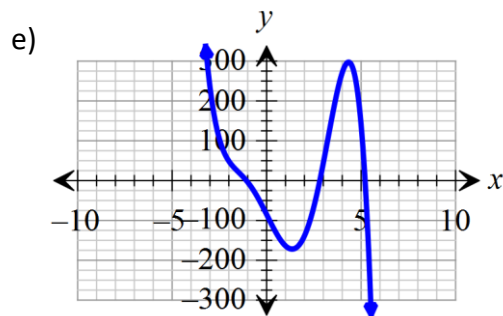
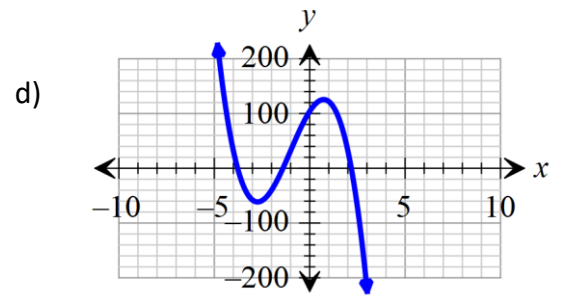
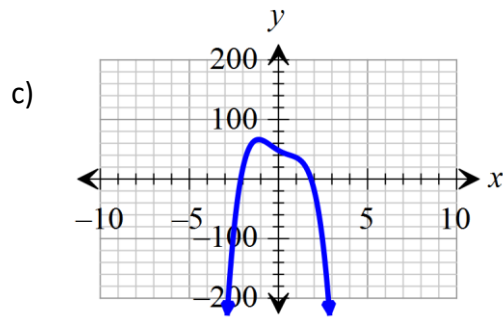
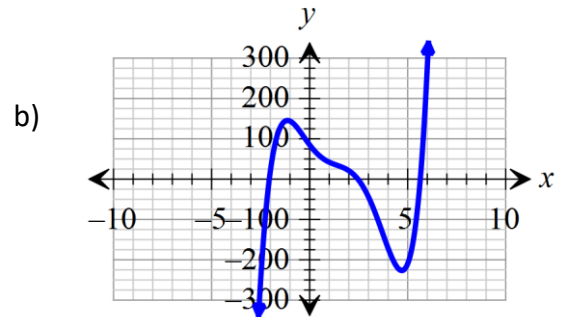
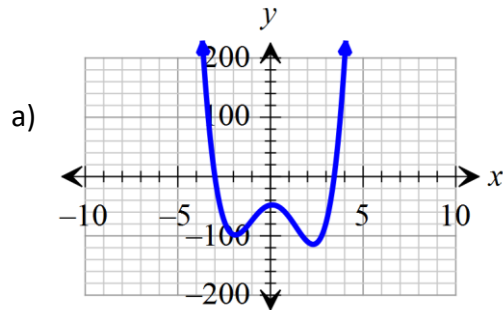
8.  $f(x) = -9x^3 + 27x^2 + 54x + 104$

9.  $f(x) = 3x^4 - 2x^3 - 26x^2 + 5x - 48$

10.  $f(x) = -5x^4 + 2x^3 + 8x^2 - 17x + 48$

11.  $f(x) = x^5 - 8x^4 + 9x^3 + 58x^2 - 164x + 85$

12.  $f(x) = -x^5 + 3x^4 + 16x^3 - 2x^2 - 95x - 85$



**Use technology to graph the polynomial. Identify the zeros, their multiplicity (you may not be able to determine the exact number so just write odd or even), determine whether they touch or cross the x-axis at each zero and determine the end behaviors.**

13.  $f(x) = x^6 - 2x^5 - 5x^4 + 4x^3 + 7x^2 - 2x - 3$

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

Zeros	Multiplicity	Touch/Cross

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

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

Zeros	Multiplicity	Touch/Cross

**Review Problems**

**Use factoring or the remainder theorem to determine which of the binomials listed are factors of the given polynomial. Show work!**

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

a)  $x - 1$

b)  $x - 2$

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

a)  $x - 1$

b)  $x + 9$

**Factor each polynomial. Use polynomial identities if necessary. Show work!**

17.  $9y^2 - 16$

18.  $9z^2 - 24z + 16$

19.  $64z^3 + 27$

20.  $2x^3 - 3x^2 + 2x - 3$

21.  $3k^2 - 19k + 20$

22.  $12ln^2 - 4$

23.  $25a^2 + 30a - 135$

24.  $20x^2 - 70xy$

25.  $16x^3 - 2$

**Use the quadratic formula to solve each equation. Show work!**

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

27.  $3x^2 - 4x - 8 = 0$