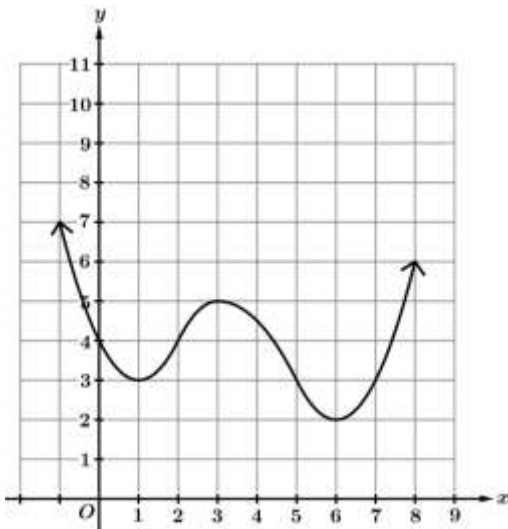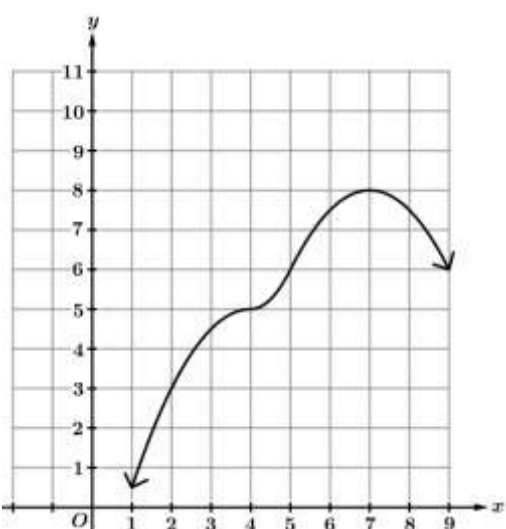# Worksheet A: (Topic 1.4) Polynomial Functions and Rates of Change

Directions: For each of the following, determine if the given function is a polynomial. If the function is a polynomial, indicate the degree.

1. $f(x) = 5x^4 - 2x^3 + 7x + 1$ Polynomial: Yes or No If yes, degree:	2. $g(x) = 3x^2 - 4^x + 8$ Polynomial: Yes or No If yes, degree:	3. $h(x) = x^5 - 4x^{-2} + 5$ Polynomial: Yes or No If yes, degree:
4. $k(x) = \dfrac{1}{3}x^5 - 2x^3 + 4x$ Polynomial: Yes or No If yes, degree:	5. $p(x) = \pi x^2 - x^3 + ex$ Polynomial: Yes or No If yes, degree:	6. $m(x) = (4 - 3x^2)(x^2 + x - 5)$ Polynomial: Yes or No If yes, degree:

Directions: For each of the following polynomial graphs, determine any x-values where the graph has a local extrema. If the graph does not have a specific local extrema, write "none" in the appropriate space.

7.

Local minimums at $x =$ _____

Local maximums at $x =$ _____

8.

Local minimums at $x =$ _____

Local maximums at $x =$ _____

Directions: For each of the following polynomial graphs, determine any x-values where the graph has a relative extrema. If the graph does not have a specific relative extrema, write "none" in the appropriate space.
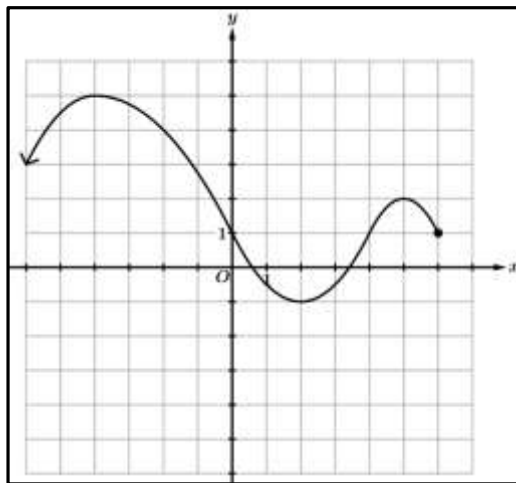
9.
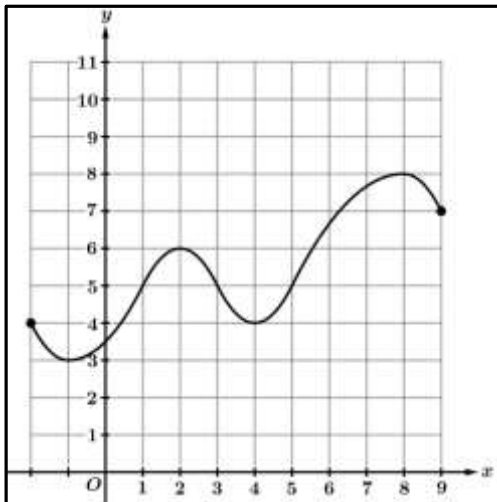
Relative minimums at $x = $ _____
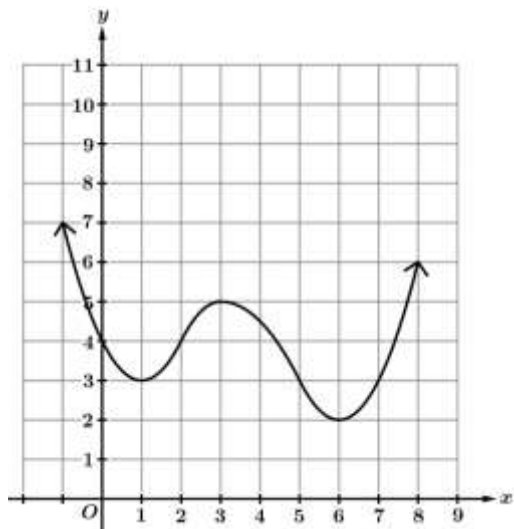
Relative maximums at $x = $ _____

10.

Relative minimums at $x = $ _____

Relative maximums at $x = $ _____

Directions: For each of the following polynomial graphs, determine the absolute minimum and absolute maximum. If the graph does not have a specific absolute extrema, write "none" in the appropriate space.
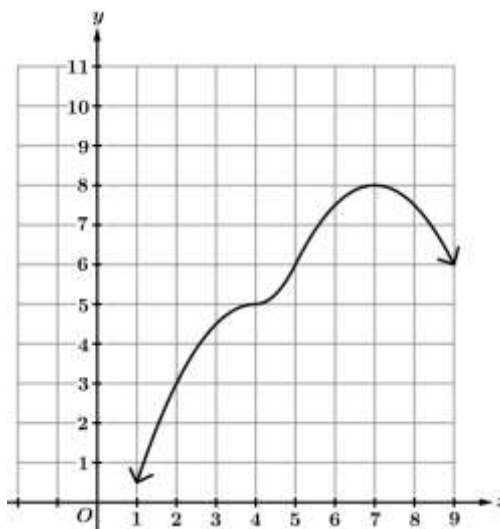
11.

Absolute minimum = _____ at $x = $ _____
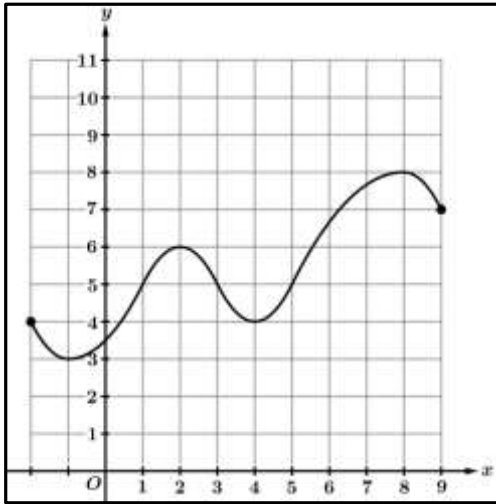
Absolute maximum = _____ at $x = $ _____

12.

Absolute minimum = _____ at $x = $ _____

Absolute maximum = _____ at $x = $ _____

Worksheet A: Topic 1.4   Rates of Change: Polynomial Functions   Created by Bryan Passwater

Directions: For each of the following polynomial graphs, determine the global minimum and global maximum. If the graph does not have a specific global extrema, write "none" in the appropriate space.
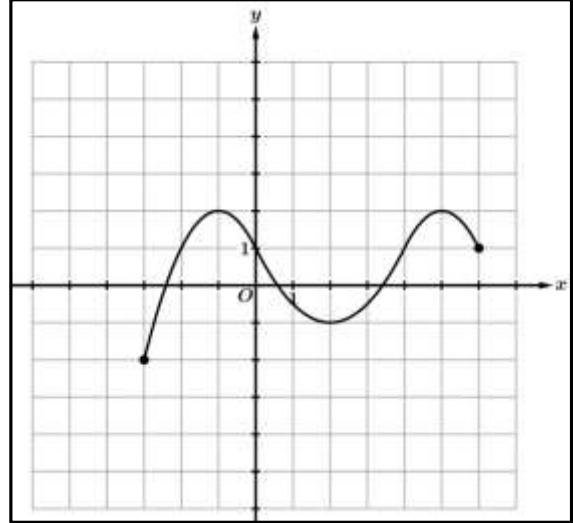
13.

Global minimum = _____ at $x =$_____

Global maximum = _____ at $x =$_____

14.

Global minimum = _____ at $x =$_____

Global maximum = _____ at $x =$_____

Directions: For each of the following, determine if the given polynomial must have a global minimum, global maximum, or neither. Explain your reasoning.
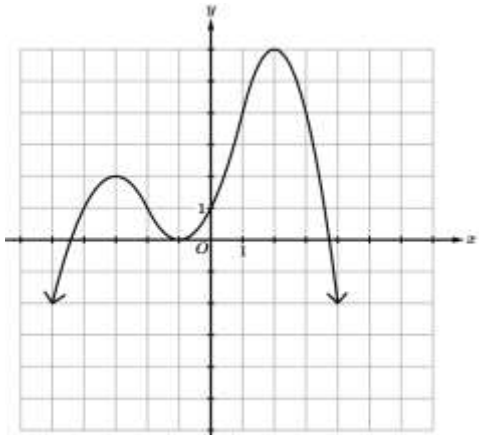
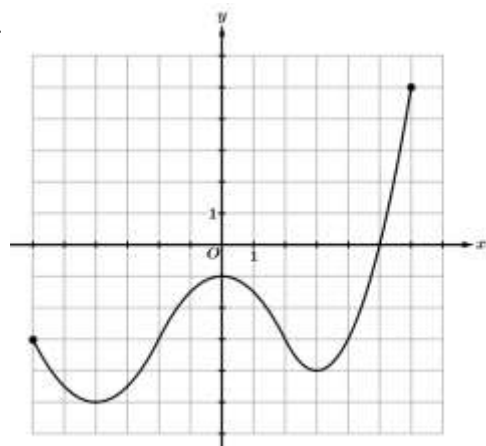15. $f(x) = x^4 - 5x^3 + x + 6$

16. $y = -2x^3 - x^2 + 8x$

17. $g(x) = -x^6 + x^3 + 4x^2 + 1$

Directions: For the following polynomial graphs, determine any x-values where the function has a point of inflection.
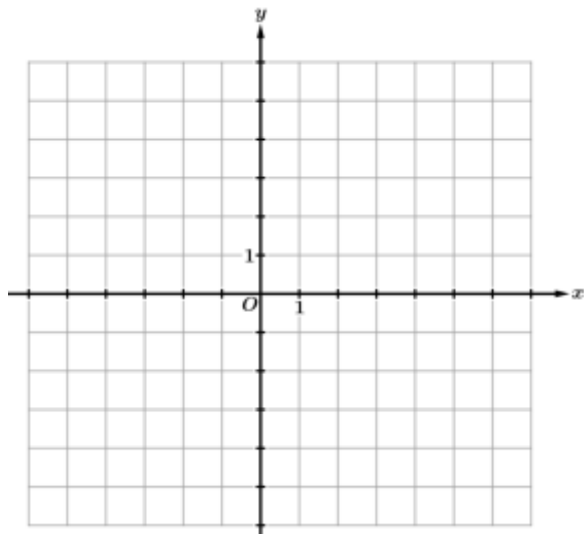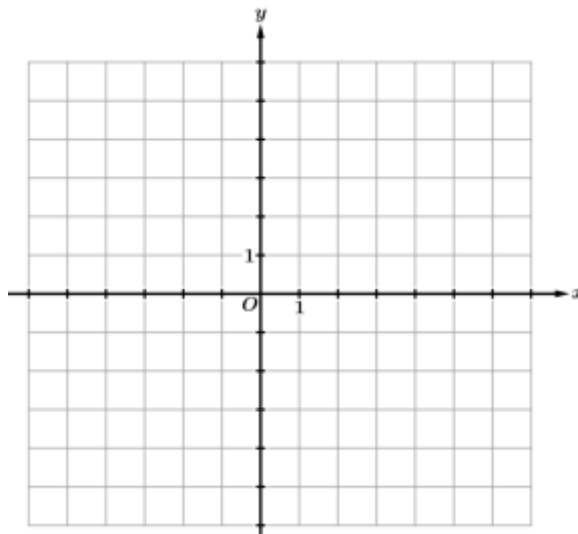
18.

19.

Directions: Sketch a polynomial function on each axes provided that has the following properties and the domain $(-\infty, \infty)$.
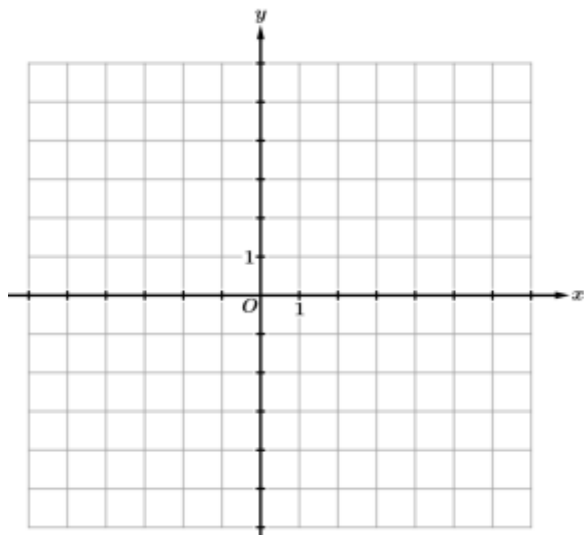
20. $f(x)$ has two points of inflection, one absolute maximum, and no absolute minimum.
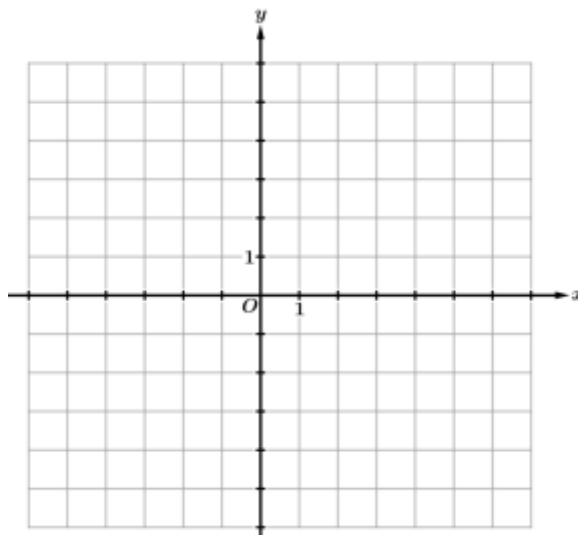

21. $g(x)$ has one local maximum, two global minima, and two points of inflection.

22. $m(x)$ has one point of inflection, no relative extrema, and no absolute extrema.

23. $k(x)$ has one absolute extremum, no points of inflection, and one local extremum.

Directions: The graph of $h(x)$ is shown below on the interval $-1 \le x \le 7$. Find the open intervals where the rate of change of $h(x)$ has the following properties.
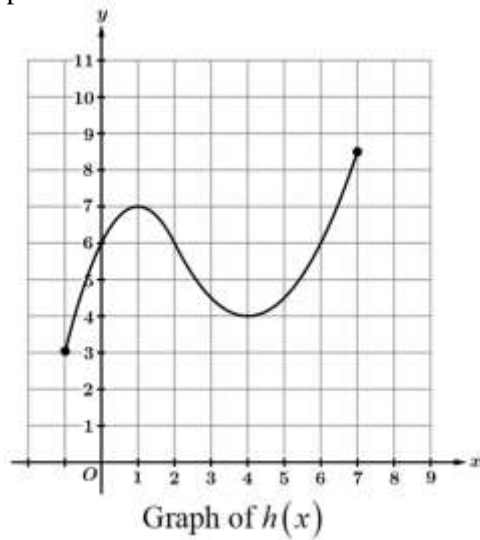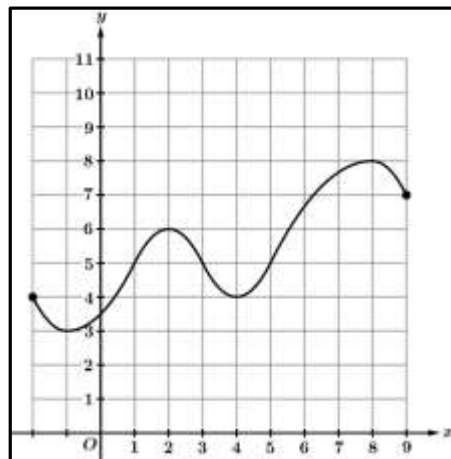

Graph of $h(x)$

24. The rate of change of $h(x)$ is positive and decreasing

25. The rate of change of $h(x)$ is negative and decreasing

26. The rate of change of $h(x)$ is positive and increasing

27. The rate of change of $h(x)$ is negative and increasing

28. Consider the graph of $g(x)$ shown above. For each of the following intervals, determine if the rate of change of $g(x)$ is positive and increasing, positive and decreasing, negative and increasing, or negative and decreasing.

a. $(3, 4)$ b. $(1, 2)$ c. $(8, 9)$ d. $(-1, 1)$