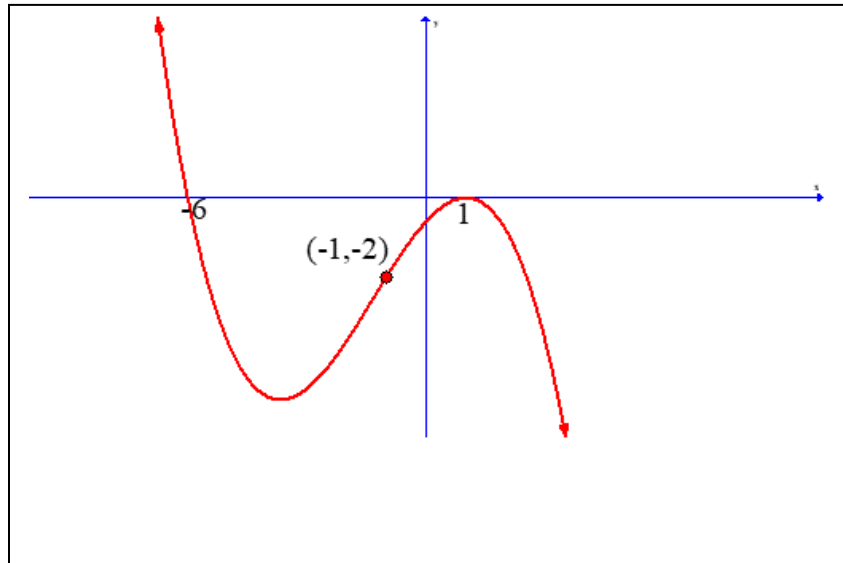# Characteristics of Polynomial Functions

Use the following graph to answer the first 3 questions.

1. The polynomial function above can be written in the form,
   $y = a (x + m) (x - n)^2$. The values of m and n respectively, are

   a) 1 and -6   b) 1- and -2   c) 6 and 1   d) -6 and 1

2. The polynomial function above can be written in the form,
   $y = a (x + m) (x - n)^2$. The value of a is

   a) $\dfrac{-1}{10}$ b) $\dfrac{1}{10}$ c) 10   d) -10

3. The value of the y-intercept is

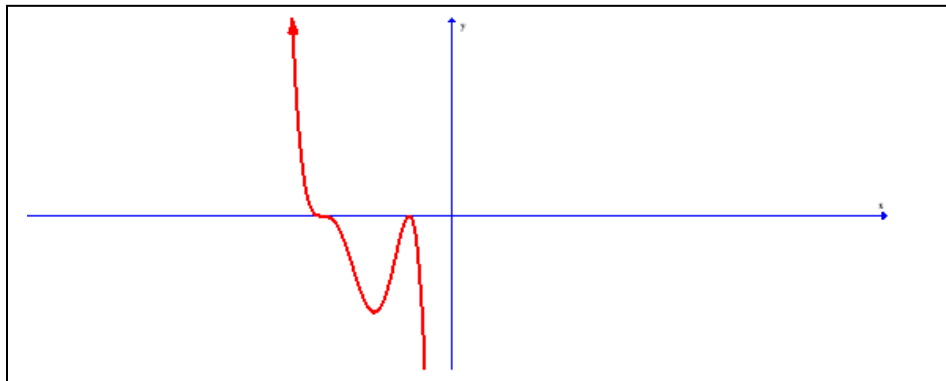   a) $\dfrac{3}{5}$ b) $\dfrac{5}{3}$ c) $\dfrac{-5}{3}$ d) $\dfrac{-3}{5}$

Given P(x) = a $(x - b)^2$ $(x - c)^2$, where a, b, and c > 0, a student makes the following observations:

1) The graph extends down into quadrant 3 and up into quadrant 1.
2) All x-intercepts are to the right of the origin.
3) The zeros each have a multiplicity of 2.
4) The y-intercept is negative.

4. The two correct observations are _____ and _____.

Possible Characteristics

| Equation	Sign of 'a'	Values of 'b' and 'c'
1. y= ax(x – b) (x – c)^3	**2.** Positive	**3.** b < 0 and c < 0
4. y= a(x – b)^2(x – c)^3	**5.** Negative	**6.** b > 0 and c > 0

5. The 3 numbers to represent a possible equation of the graph, the sign of 'a' and the signs of 'b' and 'c' are ____, ____, and ____.

Use the graph below to answer the next question.

Two different polynomial functions, f(x) and g(x) are displayed in the graph. When answering the questions, use 1 for f(x) and 2 for g(x).
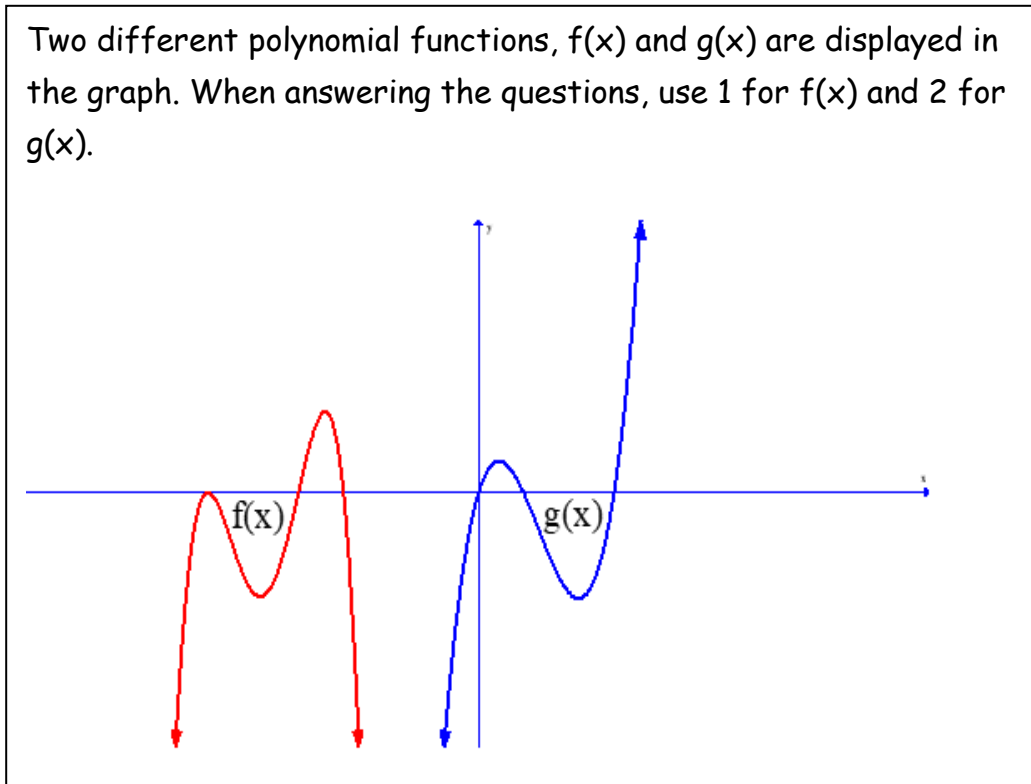
6. a) Which graph could be a degree of 4? ____
    b) Which graph has a positive leading coefficient? ____
    c) Which graph has a zero with a multiplicity other than 1? ____
    d) Which graph has the largest y-intercept? ____
    e) Which graph has the smallest x-intercept? ____
    f) Which graph has a domain different from its range? ____

7. Sketch a 5th degree polynomial, with 1 zero having a multiplicity of 2 and a negative leading coefficient.
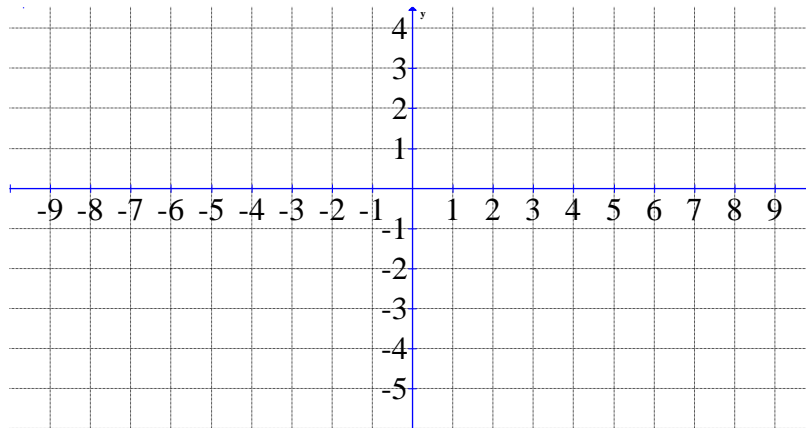
Use the graph below to answer the next question.
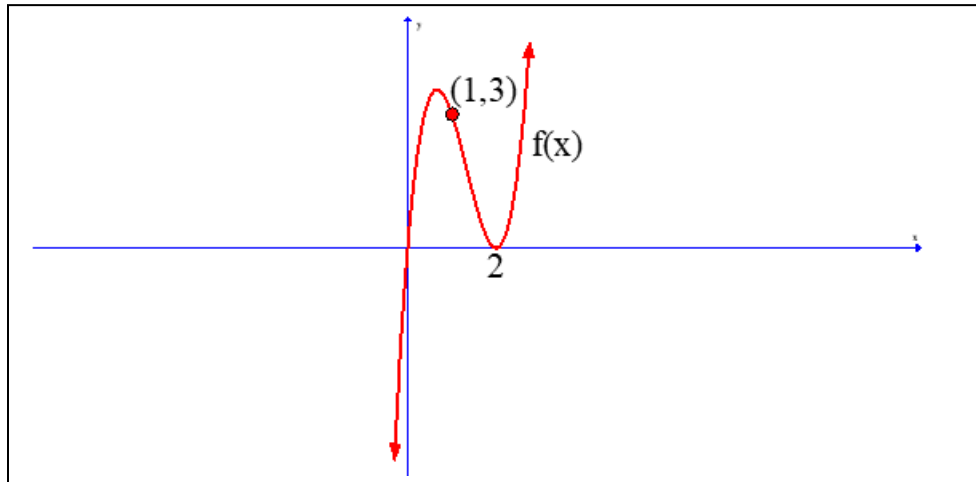
8. The graph of y = f(x) above can be written in the form y = ax (x – m)^2.
   A) What are the values of a and m?

   b) When f(x) is expanded to the form y = ax^3 + bx^2 + cx + d, what is the value of both c, and the constant?

9. Which of the following is not an example of a polynomial? Explain.

$$f(x) = -5x^3 - 7x + 1$$

$$g(x) = 2x^{-2} + 6x - 9$$