Algebra 2 Topic 5 Review Fall 2019

1. State the degree(actual NUMBER) and leading coefficient(actual NUMBER).

a) $y = -14x^4 + 9x^3 - 7x^5 - 9x + 4$ b) $f(x) = -8x^2(5x+1)(6-x)^3(4x+7)^2$

c) $y = 6x^3 - 9x^2 - x^4 - 9$

2. State whether the degree is ODD or EVEN, whether the leading coefficient is POS or NEG, and state the end behavior.

a) $y = 4x^5 - 8x^3 + 3x^4 - x^5 + 11x - 3x^5$

b) $y = 9x^2 - 8x^5 - 2x^3 + x - 13$

c) $y = -8x^2(4x-9)(6-x)(x+5)$

d) $y = 5x^2(9-x)^2(2x-7)^3(4-x)$

3. Given a 5th degree polynomial.

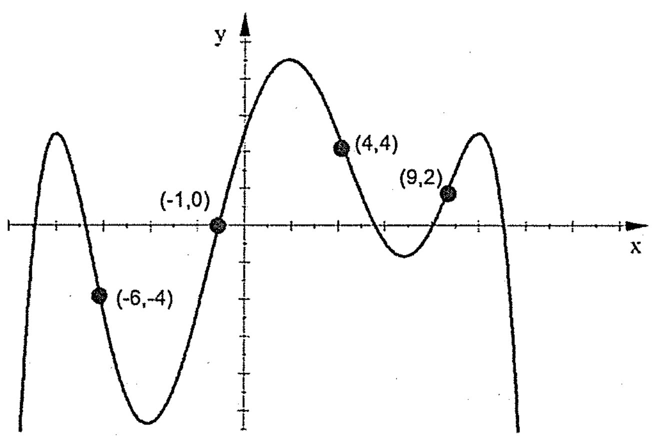
a) What is the maximum number of extremes possible?

b) If the has a negative leading coefficient and the maximum number of extremes, how many of those extremes are minimums?

c) What is the maximum number of x-intercepts possible?

d) What is the maximum number of points of inflection?

4. Use the graph at the right:



a) State all intervals that the function is concave up.

b) State all intervals that the function is concave down.

c) Suppose there is another maximum at $x = 12$, state the most likely degree of the polynomial and whether its leading coefficient is positive or negative.

5. Write a possible equation for a polynomial of given degree and given number of real zeros.

a) 5th degree with exactly 4 distinct real zeros.

b) 6th degree with exactly 2 distinct real zeros.

c) 4th degree with no real zeros.

d) 7th degree with no real zeros.

6. Sketch a graph with the given characteristics.
> Fifth degree polynomial with a positive leading coefficient.
> Increasing and concave down on the following interval: $(-\infty, -3)$.
> Decreasing and concave down on the following interval: $(-3, 0)$.
> Decreasing and concave up on the following interval: $(0, 2)$.
> Increasing and concave up on the following interval: $(2, 4)$.
> Increasing and concave down on the following interval: $(4, 6)$.
> Decreasing and concave down on the following interval: $(6, 9)$.
> Decreasing and concave up on the following interval: $(9, 11)$.
> Increasing and concave up on the following interval: $(11, \infty)$.

7. Using the characteristics in problem #6 state just the x-coordinates of the following points:
a) State the x-coordinates of all maximums.
b) State the x-coordinates of all minimums.
c) State the x-coordinates of all points of inflection.

8. Find all x-intercepts by a method other than graphing.
a) $y = 2x(x-4)(x^2-9)(x^2+1)$
b) $y = 4x^2 - 20x$
c) $f(x) = 3x^3 - 12x$
d) $f(x) = 5x^3 + 10x$
e) $0 = 2x^3 - 128$
f) $f(x) = 7x^3 + 56$

Algebra 2 Topic 5 Review Fall 2019 ANSWERS

1. a) Degree $= 5$ Leading Coefficient $= -7$
   b) Degree $= 8$ Leading Coefficient $= 640$
   c) Degree $= 4$ Leading Coefficient $= -1$

2. a) Deg: EVEN LC: POS End Behavior: (↖,↗)
   b) Deg: ODD LC: NEG End Behavior: (↖,↘)
   c) Deg: ODD LC: POS End Behavior: (↙,↗)
   d) Deg: EVEN LC: NEG End Behavior:(↙,↘)

3. a) Max # extremes $= n - 1 = 4$
   b) 2 minimums
   c) Max # x-intercepts $= n = 5$
   d) Max # pts of inflection $= 3$

4. a) concave up $(-6,-1) \cup (4,9)$
   b) concave down $(-\infty,-6) \cup (-1,4) \cup (9,\infty)$
   c) Most likely 8th degree polynomial with a negative leading coefficient.

5. There are an infinite number of answers for most of these problems. One possible answer is given.

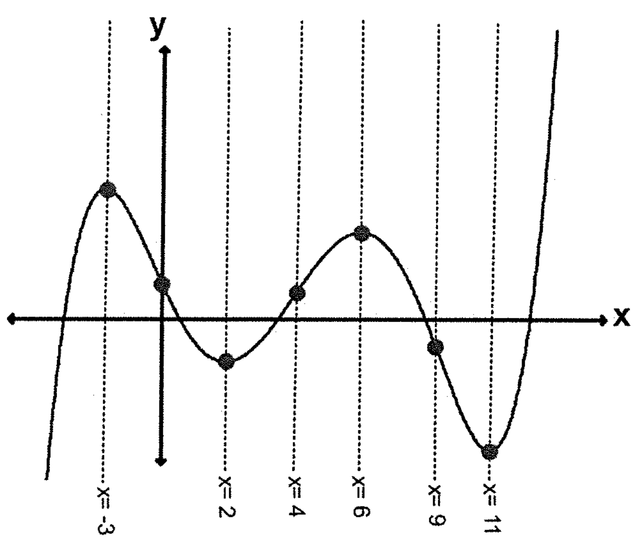
a) $(x+3)^2(x-1)(x+5)(x-2)$

b) $(x-7)^3(x+11)^3$

c) $(x^2+5)(x^2+2)$

d) Not possible. All polynomials of odd degree must have at least one x-intercept (real zero).

6. A possible answer is shown below:



7. a) Maximums when $x = -3$ and 6
   b) Minimums when $x = 2$ and 11
   c) Points of inflection when $x = 0, 4, 9$

8. a) $x - int\ :\ 0, 4, \pm 3$ b) $x - int\ :\ 0, 5$ c) $x - int\ :\ 0, \pm 2$
   d) $x - int\ :\ 0$ e) $x - nt\ :\ 4$ f) $x - int\ :\ -2$