In-class Assignment: Section 5.1

In problems 1 - 3, for each polynomial function:

(a) List each real zero and its multiplicity.

(b) Determine whether the graph crosses through the \( x \)-axis or touches the \( x \)-axis and turns around at each \( x \)-intercept.

(c) Determine the maximum number of turning points on the graph.

(d) Determine the end behavior; that is, find the power function that the graph of \( f \) resembles for large values of \( |x| \).

1. \( f(x) = -2(x - 4)^3(x + 1)^2 \)
   
   (a) List each real zero and its multiplicity. \( x = 4, \) multiplicity = 3; \( x = -1, \) multiplicity = 2
   
   (b) Determine whether the graph crosses through the \( x \)-axis or touches the \( x \)-axis and turns around at each \( x \)-intercept. At \( x = 4 \), the graph crosses through the \( x \)-axis; at \( x = -1 \) the graph touches the \( x \)-axis and turns around
   
   (c) Determine the maximum number of turning points on the graph. 4
   
   (d) Determine the end behavior; that is, find the power function that the graph of \( f \) resembles for large values of \( |x| \). \( f(x) = -2x^5 \)

2. \( f(x) = (x + 2)^2(x + 5)^4 \)
   
   (a) List each real zero and its multiplicity. \( x = -2, \) multiplicity = 2; \( x = -5, \) multiplicity = 4
   
   (b) Determine whether the graph crosses through the \( x \)-axis or touches the \( x \)-axis and turns around at each \( x \)-intercept. The graph touches the \( x \)-axis and turns around at both \( x \)-intercepts.
   
   (c) Determine the maximum number of turning points on the graph. 5
   
   (d) Determine the end behavior; that is, find the power function that the graph of \( f \) resembles for large values of \( |x| \). \( f(x) = x^6 \)

3. \( f(x) = \frac{1}{2} (x^2 + 9) (x - 3) \)
   
   (a) List each real zero and its multiplicity. \( x = 3, \) multiplicity = 1
   
   (b) Determine whether the graph crosses through the \( x \)-axis or touches the \( x \)-axis and turns around at each \( x \)-intercept. The graph crosses through the \( x \)-axis at \( x = 3 \).
   
   (c) Determine the maximum number of turning points on the graph. 2
(d) Determine the end behavior; that is, find the power function that the graph of \( f \) resembles for large values of \( |x| \). \( f(x) = \frac{1}{2}x^3 \)

Graph each of the following polynomial functions.

4. \( f(x) = x^2(x - 4)(x + 2) \)

5. \( f(x) = (x - 1)^2(x + 1)(x + 2)^2 \)

6. \( f(x) = -\frac{1}{48}(x - 3)^3(x + 4)^2 \)