Directions: Please answer the following questions and make sure your answer are legible. If you don’t show work and/or I can’t follow it, I won’t give partial credit. You may not use a calculator (or any other technology) on this quiz. Good Luck.

1. For the polynomial function \( f(x) = -3(x + 1)(2x - 3)^2 \)
   (a) (2 points) List each real zero and its multiplicity. 
   \[ -1 \text{: mult}=1 \]
   \[ \frac{3}{2} \text{: mult}=2 \]
   (b) (3 points) Determine the behavior of the graph near each \( x \)-intercept (zero).
   (c) (1 point) Determine the maximum number of turning points.
   \[ \text{max turning points} \]
   (d) (1 point) Determine the end behavior of the graph.
   \[ f(x) = -3(x)(2x)^2 \]
   \[ f(x) = -12x^3 \]
   (behaves like \(-12x^3\))
   (e) (3 points) Sketch the graph using the information above.

There is a question on the back!
2. (5 points) List the vertical and horizontal asymptotes of the following. (If none, say 'none')

\[ f(x) = \frac{x^2 - 3x - 4}{x^4 - 1} \]

\[ f(x) = \frac{(x - 4)(x + 1)}{(x + 1)(x - 1)(x^2 + 1)} \]

Reduced

\[ f(x) = \frac{x - 4}{(x - 1)(x^2 + 1)} \]

Vertical Asymptote: \( x = 1 \)

Horizontal Asymptote: \( y = 0 \)