Name: _____ Date: _____

AP Calculus AB: Extreme Value Theorem HW Ms. Loughran

2001: AB-4; BC-4

Let *h* be a function defined for all $x \neq 0$ such that $h(4) = -3$ and the derivative of *h* is given by $h'(x) = \frac{x^2 - 2}{x}$ for all $x \neq 0$.

(a) Find all values of *x* for which the graph of *h* has a horizontal tangent, and determine whether *h* has a local maximum, a local minimum, or neither at each of these values. Justify your answers.
(b) On what intervals, if any, is the graph of *h* concave up? Justify your answer.
(c) Write an equation for the line tangent to the graph of *h* at $x = 4$.
(d) Does the line tangent to the graph of *h* at $x = 4$ lie above or below the graph of *h* for $x > 4$? Why?

For 1 and 2, find the absolute maximum and minimum values of *f* on the given closed interval, and state where those values occur.

1. $f(x) = 4x^2 - 4x + 1;\ [0,1]$

2. $f(x) = \frac{3x}{\sqrt{4x^2 + 1}};\ [-1,1]$

3. Find the absolute maximum and minimum values of *f*, if any, on the given interval and state where those values occur.

$$f(x) = x^2 - 3x - 1;\ (-\infty,\infty)$$