

**MAT 319 HOMEWORK-12 DUE AT THE BEGINNING OF CLASS ON WEDNESDAY,
NOVEMBER 28**

One goal for this course is for you to develop your skill in effectively communicating mathematics. With this in mind, you should clearly write up your solutions. Solutions with little or no justification will receive little or no credit. Clear, organized, partially correct work may receive partial credit.

- (1) Consider the function $g(x) = |x^2 - 1|$
 - (a) Determine where g is differentiable, and determine its derivative at these points.
 - (b) Determine where g is not differentiable, and prove it is not differentiable at these points.
- (2) A real-valued function of a real variable, f is called an *even* function if, for all $x \in \mathbb{R}$, $f(-x) = f(x)$. If, for all $x \in \mathbb{R}$, $f(-x) = -f(x)$ then f is called *odd*.
 - (a) Prove that, if an even function f is differentiable on \mathbb{R} , then f' is an odd function.
 - (b) Prove that, if an odd function g is differentiable on \mathbb{R} , then g' is an even function.
- (3) Let f denote a differentiable function on an open interval (a, b) . Suppose there exists $M \in \mathbb{R}$ such that $|f'(x)| \leq M$ for all $x \in (a, b)$. Prove that f is uniformly continuous on (a, b) .
- (4) Do problems 28.4, 29.2, 29.14