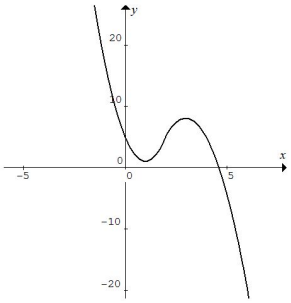
Name _____

Homework 13
section 2.6

1. (6) Determine whether the function $f(x) = \begin{cases} 4(x-1)^2+1 & \text{for } x \leq 2 \\ -3(x-3)^2+8 & \text{for } x > 2 \end{cases}$ is differentiable at $x = 2$. If so, find $f'(2)$. The graph of $f(x)$ is shown below.



2. (6) Determine whether or not the function $g(x) = (x + |x|)^2 - 1$ is differentiable at $x = 0$. If so, find $g'(0)$.

3. (3,3,2) A cable is made of an insulating material in the shape of a long, thin cylinder of radius r_0. It has electric charge distributed evenly throughout it. The electric field E at a distance r from the center of the cable is given by

$$E(r) = \begin{cases} kr & \text{for } r \leq r_0 \\ k\frac{r_0^2}{r} & \text{for } r > r_0 \end{cases}.$$

(a) Is E continuous at $r = r_0$? Check algebraically (use the definition of continuity).

(b) Is E differentiable at $r = r_0$? Be sure to use the definition of differentiable.

(c) Sketch a graph of E as a function of r.