

# Math 171 - Quiz 8

October 24, 2013

Name key

Score \_\_\_\_\_

Show all work to receive full credit. Supply explanations when necessary.

1. (10 points) Let  $g(x) = \frac{4x^2 - 1}{2x^2 + 1}$ .

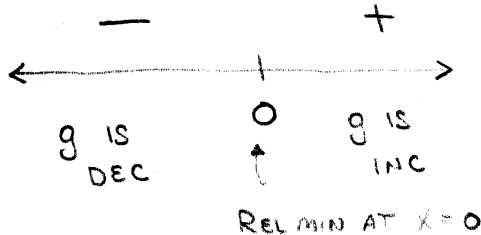
- Find open intervals on which  $g$  is increasing/decreasing.
- Identify all relative extrema.
- Find open intervals on which the graph of  $g$  is concave up/down.
- Identify all inflection points.

$$g'(x) = \frac{8x(2x^2+1) - 4x(4x^2-1)}{(2x^2+1)^2} = \frac{12x}{(2x^2+1)^2}$$

$$g'(x) = 0 \Rightarrow x = 0$$

$g'(x)$  DNE NOWHERE

Signs  
of  $g'$



$g$  IS DECREASING ON  $(-\infty, 0)$

$g$  IS INCREASING ON  $(0, \infty)$

$g(0) = -1$  IS A REL MIN

$$g''(x) = \frac{12(2x^2+1)^2 - 24x(2x^2+1)(4x)}{(2x^2+1)^4} =$$

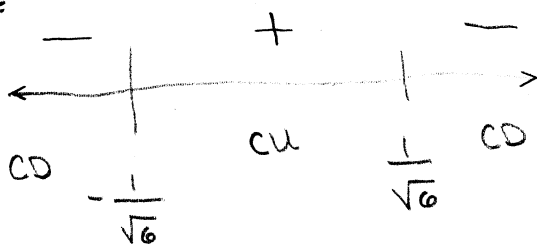
$$\frac{-144x^4 - 48x^2 + 12}{(2x^2+1)^4} = \frac{-12(12x^4 + 4x^2 - 1)}{(2x^2+1)^4}$$

$$= \frac{-12(6x^2-1)(2x^2+1)}{(2x^2+1)^4} = \frac{-12(6x^2-1)}{(2x^2+1)^3}$$

$$g''(x) = 0 \Rightarrow 6x^2 - 1 = 0 \Rightarrow x = \pm \frac{1}{\sqrt{6}}$$

$g''(x)$  DNE NOWHERE

Signs of  
 $g''$



Graph is CD on  $(-\infty, -\frac{1}{\sqrt{6}})$   
 $\cup (\frac{1}{\sqrt{6}}, \infty)$

Graph is CU on  $(-\frac{1}{\sqrt{6}}, \frac{1}{\sqrt{6}})$

Inflection pts are  $(\pm \frac{1}{\sqrt{6}}, \frac{1}{4})$