

Each problem is worth 5 points. Clear and complete justification is required for full credit.

1. Find the critical numbers of the function  $f(x) = x^4 - 6x^2 + 3$ .

$$f(x) = x^4 - 6x^2 + 3$$

$$f'(x) = 4x^3 - 12x \quad \leftarrow \text{Power Rule \& Constant Rule}$$

$$4x^3 - 12x = 0 \quad \leftarrow \text{Find where tangent line is horizontal}$$

$$4x(x^2 - 3) = 0$$

$$4x = 0$$

$$x = 0$$

$$x^2 - 3 = 0$$

$$\sqrt{x^2} = \sqrt{3}$$

$$x = \pm\sqrt{3}$$

critical #'s =  $0, \pm\sqrt{3}$

Great

2. Find the absolute maximum and minimum values of  $g(x) = 2x^3 - 3x^2 - 12x + 2$  on the interval  $[0, 4]$ .

$$g(x) = 2x^3 - 3x^2 - 12x + 2 \quad [0, 4]$$

$$g'(x) = 6x^2 - 6x - 12$$

$$0 = 6(x^2 - x - 2)$$

$$0 = 6(x - 2)(x + 1)$$

$x = 2$  or  $x = -1 \rightarrow$  does not fit into the interval

$$g(0) = 2$$

$$g(2) = -18$$

$$g(4) = 34$$

Excellent!

absolute max  $g(4) = 34$

absolute min  $g(2) = -18$