

**Math 118 Calculus Ia In-class Skills 7B (due Thurs, Dec 1) - 2 pages Increase and Decrease**

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1. Let  $f(x) = x^3 - 3x^2 + 4$ . We'll analyze the increasing/decreasing behavior of  $f$ , and its relative extrema.

a. Compute  $f'(x)$  and solve to find any critical numbers.  
(You should be able to factor  $f'(x)$  pretty easily.)

b. Determine the sign of  $f'(x)$  on the intervals cut out by the critical numbers.

c. Give the correct intervals to complete the following:

$f$  is increasing on...

and  $f$  is decreasing on...

d. Read Thm 5.6 p331 and Examples 2-4 from p331-334. Then classify each of the critical numbers as a relative max, relative min, or neither. Find the  $(x, y)$  coordinates of the point on the graph at each critical number.

2. We'll do the same sorts of things now with  $g(x) = x^4 - (4/3)x^3 - 2x^2 + 4x$ .

a. Compute  $g'(x)$  and solve to find any critical numbers.

Hint:  $(x + 1)$  is one factor of  $g'(x)$ .

b. Determine the sign of  $g'(x)$  on the intervals cut out by the critical numbers.

c. Describe the intervals on which  $g(x)$  is increasing and decreasing.

d. Read Thm 5.6 p331 and Examples 2-4 from p331-334. Then classify each of the critical numbers of  $g$ , and find the coordinates on the graph of  $g$  at each critical number.

3a. (A bit extra - optional!) Return to the cubic function  $f(x)$  from problem #1. Solve to find the zeros of  $f(x)$ . On separate paper, make a large, clear sketch of the graph of  $f$  by hand, showing the correct  $x$ - and  $y$ -intercepts, the correct points at the critical numbers, and the correct increasing/decreasing behavior on all intervals.