

HONOR 2201, CALCULUS FOR NON-SCIENCE MAJORS, QUIZ 4, 09/30/05

Name: Solution

Student ID #: _____

Each problem of #(1)-#(3) is worth 5 points.

Let $f(x) = \frac{1}{3}x^3 - x^2 - 3x + 1$ be given.

(1) Find all critical points of the given f above.

$$f'(x) = x^2 - 2x - 3$$

$$= (x-3)(x+1)$$

$$f'(x) = 0 \Rightarrow (x-3)(x+1) = 0$$

$$\Rightarrow \boxed{x = 3 \text{ or } -1} \leftarrow \text{critical points of } f.$$

2. Find a local maximum and a local minimum of f given in the above.

$$f''(x) = 2x - 2$$

$$f''(3) = 6 - 2 = 4 > 0$$

$$f''(-1) = -2 - 2 = -4 < 0.$$

} \Rightarrow By 2nd derivative test,
 f has a local min at $x=3$
 & a local max at $x=-1$.

3. Find all inflection points of f given in the above (here, you need to justify why they are inflection points).

$$f''(x) = 2x - 2 = 0$$

$$\Rightarrow x = 1$$

x		1		
f''		-		+

\Rightarrow The concavity changes at $x=1$.

So $x=1$ is an inflection points.