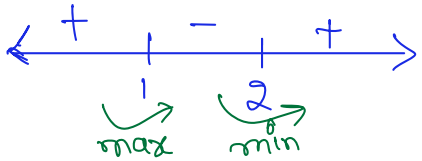
Name: [1 pt]

Problem 1. Use the first derivative test to find the relative maximum and minimum values of

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

[5 pts]

$f'(x) = x^2 - 3x + 2 = (x-1)(x-2)$



$\Rightarrow$ $x=1$ is a max pt.

$x=2$ is a min pt.

$\Rightarrow$ max. value $= f(1) = \frac{1}{3} - \frac{3}{2} + 2 + 1 = \frac{2-9+12+6}{6}$

$= \frac{11}{6}$

$\Rightarrow$ min value $= f(2) = \frac{8}{3} - \frac{12}{2} + 4 + 1 = \frac{8}{3} - 6 + 5 = \frac{8}{3} - 1$

$= \frac{5}{3}$

Problem 2. Use the second derivative test to find the relative maximum and minimum values of

$$f(x) = x^2 + \frac{2}{x} .$$

[5 pts]

$f'(x) = 2x - \frac{2}{x^2} = \frac{2x^3 - 2}{x^2}$

$f'(x) = 0 \Rightarrow \frac{2x^3-2}{x^2} = 0 \Rightarrow 2x^3 - 2 = 0 \Rightarrow 2x^3 = 2$

$\Rightarrow x^3 = 1 \Rightarrow x = 1$

(only real solution)

$f''(x) = 2 + \frac{4}{x^3} \Rightarrow f''(1) = 2 + \frac{4}{1} = 6 > 0$

$\Rightarrow x = 1$ is a pt. of minima.

$\Rightarrow$ Minimum value $= f(1) = 1 + \frac{2}{1} = 3$

and there is no relative maximum value.