

Name:

Student ID: SOLUTIONS

Quiz 9

This quiz is graded out of 10 marks. No books or notes are allowed. SHOW ALL YOUR WORK.
If you need more space for your answer use the back of the page.

Question 1. (5 marks)

Find the absolute extrema of the function $f(x) = \frac{1}{3}x^3 + 3x^2 - 7x + 12$ on the interval $[-10, 10]$.

$$\begin{aligned} f'(x) &= x^2 + 6x - 7 \\ &= (x+7)(x-1) \quad \text{so CRITICAL \#s are} \\ x &= -7 \quad \& \quad x = 1 \end{aligned}$$

$$f(-7) = \frac{1}{3}(-7)^3 + 3(-7)^2 - 7(-7) + 12 = 93\frac{2}{3}$$

$$f(1) = \frac{1}{3}(1)^3 + 3(1)^2 - 7(1) + 12 = 8\frac{1}{3}$$

$$f(-10) = \frac{1}{3}(-10)^3 + 3(-10)^2 - 7(-10) + 12 = 48\frac{2}{3}$$

$$f(10) = \frac{1}{3}(10)^3 + 3(10)^2 - 7(10) + 12 = 575\frac{1}{3}$$

SO THE ABSOLUTE MAX IS $575\frac{1}{3}$ AT $x=10$
& THE ABSOLUTE MIN IS $8\frac{1}{3}$ AT $x=1$

Question 2. (5 marks)

Find the intervals on which the function $f(x) = x^2 - 5x + 12$ is decreasing.

$$f'(x) = 2x - 5$$

$$\text{CRITICAL \# } x = \frac{5}{2}$$

INTERVAL	$-\infty < x < \frac{5}{2}$	$\frac{5}{2} < x < \infty$
TEST POINT	0	3
Sign of f'	$\ominus$	$\oplus$
INCR OR DECR.	decr.	incr.

SO $f(x)$ is increasing for $\frac{5}{2} < x < \infty$
& decreasing for $-\infty < x < \frac{5}{2}$