Name: Key **Date** _____

Instructions: For each question, neatly write a solution and circle your answer.

1. Find all numbers c that satisfy the conclusion of the Mean Value Theorem for $f(x) = x^2 - 5x + 6$ on the interval $[0, 4]$.

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

$\frac{f(x_2) - f(x_1)}{x_2 - x_1} = \frac{2 - 6}{4 - 0} = \frac{-4}{4} = -1$

$f'(c) = -1$

$2c - 5 = -1$

$2c = 4$

$\boxed{c = 2}$

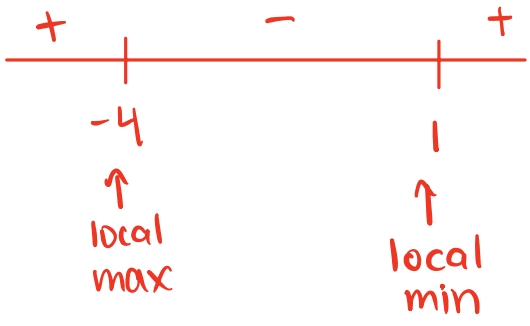
1. For $f(x) = \frac{1}{3}x^3 + \frac{3}{2}x^2 - 4x + 7$, find:

(a) the critical numbers of $f(x)$.

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

$0 = (x+4)(x-1)$

$x = -4, 1$



(b) the interval(s) where $f(x)$ is

(i) increasing: $(-\infty, -4) \cup (1, \infty)$

(ii) decreasing: $(-4, 1)$

(c) all values of x where $f(x)$ has a

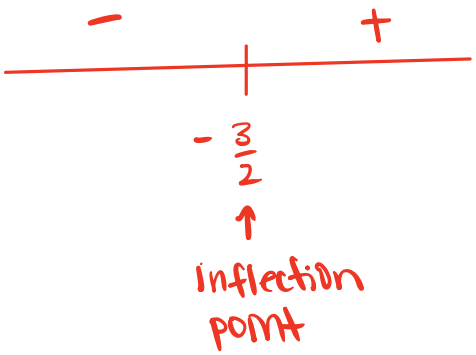
(i) local minimum: $x = 1$

(ii) local maximum: $x = -4$

(d) all values of x where $f(x)$ has an inflection point.

$f''(x) = 2x + 3$ $\quad 2x = -3$

$0 = 2x + 3$ $\quad x = -\frac{3}{2}$



(e) the interval(s) where $f(x)$ is

(i) concave up: $(-\frac{3}{2}, \infty)$

(ii) concave down: $(-\infty, -\frac{3}{2})$