

Week 3 Homework MAT 2601 (Homework)

Question 1

- (a) $(-3, 5)$
- (b) $(1, 1)$
- (c) $(-4, 2)$

Question 2

- (a) $(4, 7)$
- (b) $(-2, 3)$
- (c) $(1, 5)$

Question 3

- (a) $x = 4, 9$
- (b) $(4, 9)$
- (c) $(-\infty, 4) \cup (9, \infty)$
- (d) $x = 9$
- (e) $x = 4$

Question 4

- (a) $x = \cancel{1.26} + 0, -2$
- (b) Relative maxima: $(x, y) = (-2, -3)$
Relative minima: $(0, -19)$

Question 5

- (a) Relative maxima: D.N.E
- Relative minima: D.N.E
- horizontal point of inflection: $(3, 6)$

(b) $x = 3$

(c) $(3, 0)$

Question 6.

(a) $x^2 + x - 2$

(b) $x = -2, 1$

(c) $(-2, \frac{16}{3})$ - smaller x-value

$(1, \frac{5}{6})$ - larger x-value

d $(-\infty, -2) \cup (1, \infty)$ - Increasing.

Decreasing: $(-2, 1)$

(e) Relative maxima: $(-2, \frac{16}{3})$

Relative minima: $(1, \frac{5}{6})$

horizontal point of inflection: DNE

Question 7

Relative maxima: $(-6, 138)$

Relative minima: $(4, -\frac{86}{3})$

horizontal points of inflection: DNE

Graph: 2nd graph.

Question 8

Relative maxima: $(-1, 8)$

Relative minima: $(1, 4)$

horizontal point of inflection: $(0, 6)$

Sketch the graph: 8th Graph.

Question 9

$x = 0, 2$

Critical points: $(0, 0)$ - smaller x -value -

$(2, -4.7622)$ - Larger x value.

Intervals on which the function is increasing:

$(-\infty, 0) \cup (2, \infty)$

Intervals on which the function is decreasing:

$(0, 2)$

Relative maxima: $(0, 0)$

Relative minima: $(2, -4.7622)$

horizontal point of inflection: DNE

Sketch the graph: 2nd graph.

Question 10.

$$x = -2, 3.$$

Intervals where $f(x)$ is increasing: $(-\infty, -2) \cup (3, \infty)$

Intervals where $f(x)$ is decreasing: $(-2, 3)$

Relative maxima: $x = -2.$

Relative minima: $x = 3.$

horizontal points of inflection: $x = \text{DNE}$

Sketch possible graph: 1st Graph.

Question 11

- (a) concave ~~up~~ down
- (b) concave ~~down~~ up.

Question 12

$$g'(x) = 8x^3 - 15x^2 + 13.$$

$$g''(x) = 24x^2 - 30x$$

$$g''(1) = -6$$

$$g''\left(\frac{5}{2}\right) = 75$$

~~a~~

- (a) $x = 1$: concave ~~up~~ down
- (b) $x = \frac{5}{2}$: concave ~~down~~ up

Question 13.

(a, c)

Question 14

Interval on which the function is concave up.

$(2, \infty)$

Interval on which the function is concave down.

$(-\infty, 2)$

Locate point of inflection: DNE

Question 15

Relative maxima: DNE

Relative minima: $(2, -1)$

Point of inflection: DNE

Sketch the graph: 4th graph.

Question 16

Relative maxima: $(2, 16)$

Relative minima: $(0, 0)$ - (smaller x-value)

$(4, 0)$ - (larger x-value)

Points of inflection: DNE (smaller x-value)

DNE (larger x-value)

Sketch the function: 2nd graph.

Question 17

Relative maxima: DNE

Relative minima: $(2, -7.56)$

point of inflection: $(0, 0)$ - ~~larger~~ smaller x-value

D.N.E. - larger x-value.

Sketch the graph: 2nd graph.

Question 18

- | | |
|------------------------|----------|
| (a) A, G, # | (a) G, # |
| (b) #, C, # | (b) C, # |
| (c) F | (c) F |
| (d) #, H | (d) #, D |
| (e) I | (e) I |

Question 19

- (a) C
- (b) left side.
- (c) Yes, $s''(t)$ changes from positive to negative at point C

Question 20

- (a) $t = 4$ months.
- (b) $t = 8$ months.