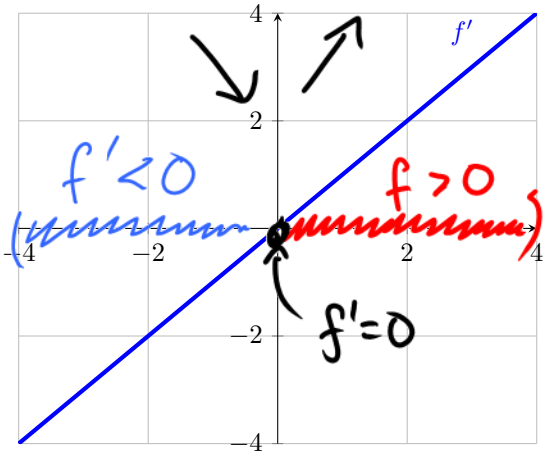
Goal: Recover information about a function f from the graph of f'.

1 Inc/Dec

Problem 1. *Use the graph of f' to determine the following about f:*



(a) Intervals of increase/decrease

$f'>0$ ← f' needs to be above the x-axis

Increasing on the interval $(0,\infty)$

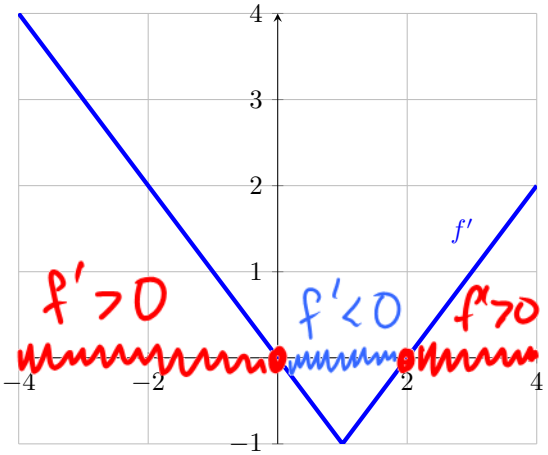
Dec on $(-\infty,0)$

(b) Positions of relative max/mins

Crit Nums: $x=0$

Relative Minimum at $x=0$

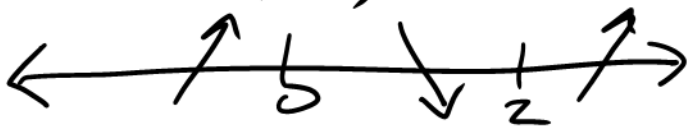
Problem 2. *Use the graph of f' to determine the following about f:*



(a) Intervals of increase/decrease

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

Dec: $(0,2)$



(b) Positions of relative max/mins

At $x=0$, ↗↘, rel. max by the 1st derivative test.

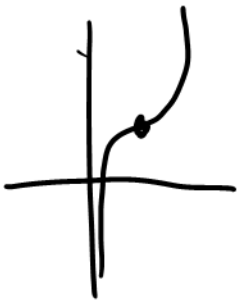
At $x=2$, ↘↗, rel. min

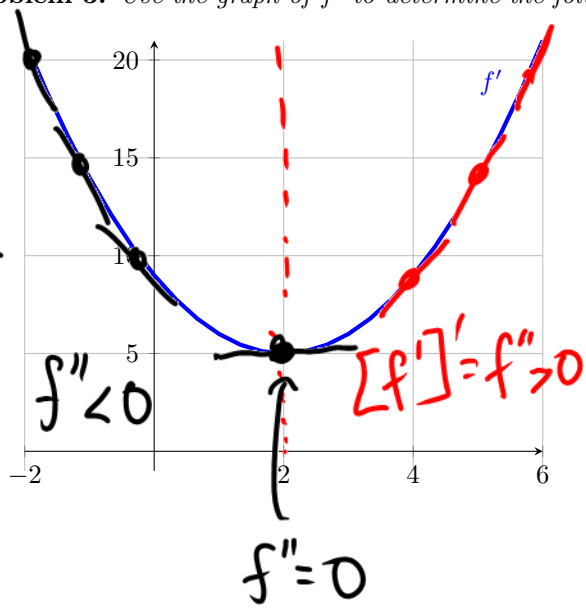
2 Concavity

CU: $f'' > 0$

$[f']' > 0$

Problem 3. *Use the graph of f' to determine the following about f:*



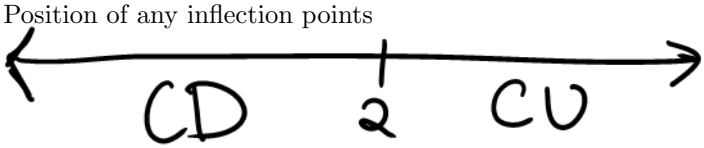


(a) When f is concave up VS. concave down

CU on $(2, \infty)$

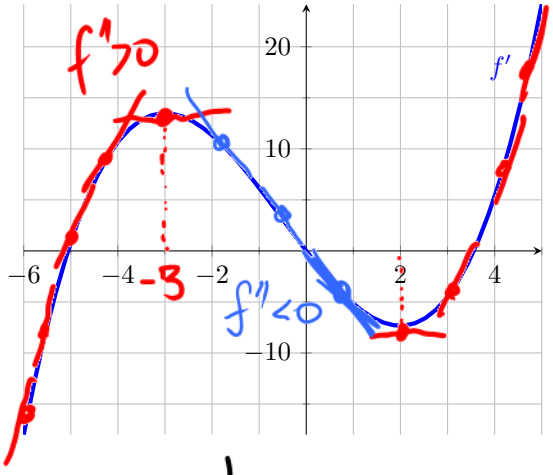
CD on $(-\infty, 2)$

(b) Position of any inflection points



Inflection Point at $x = 2$

Problem 4. *Use the graph of f' to determine the following about f:*



(a) When f is concave up VS. concave down

CU : $(-\infty, -3) \cup (2, \infty)$

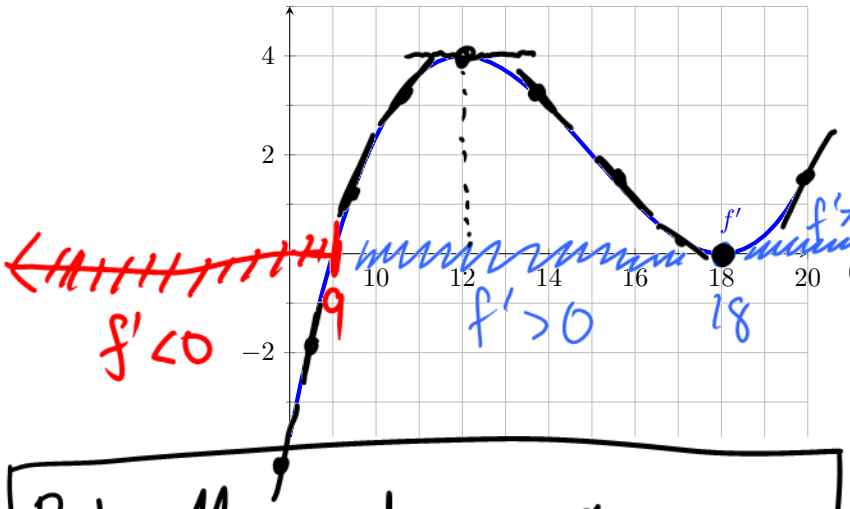
CD : $(-3, 2)$

(b) Position of any inflection points

When $f'' = 0$ | Inflection Points at $x = -3, 2$

3 Putting Everything Together

Problem 5. *Use the graph of f' to determine the following about f:*



(a) Intervals of Increase/Decrease

Inc: $(9,\infty) \mid \{18\}$

$(9,18) \cup (18,\infty)$

Dec: $(-\infty, 9)$

(b) When f is concave up VS concave down

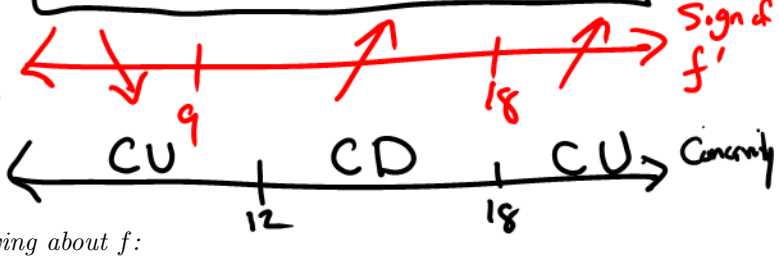
CU: $(-\infty, 12) \cup (18, \infty)$

CD: $(12, 18)$

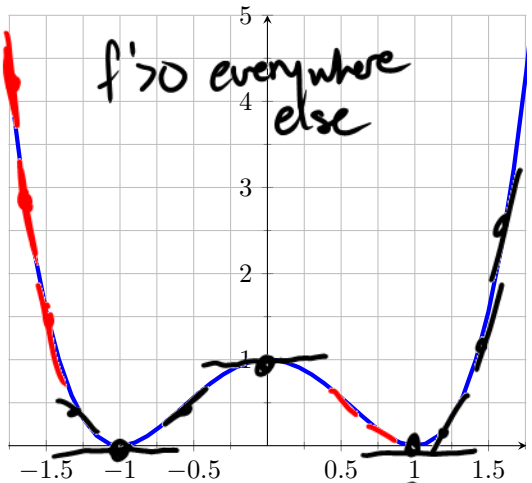
Rel. Min at $x = 9$

Inflection Points at $x = 12, 18$

(c) State the locations of any relative max/mins as well as inflection points



Problem 6. *Use the graph of f' to determine the following about f:*



(a) Intervals of Increase/Decrease

Increasing on

$(-\infty, -1) \cup (-1, 1) \cup (1, \infty)$

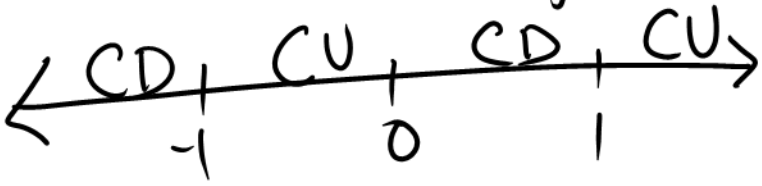
(b) When f is concave up VS concave down

CU: $(-1, 0) \cup (1, \infty)$

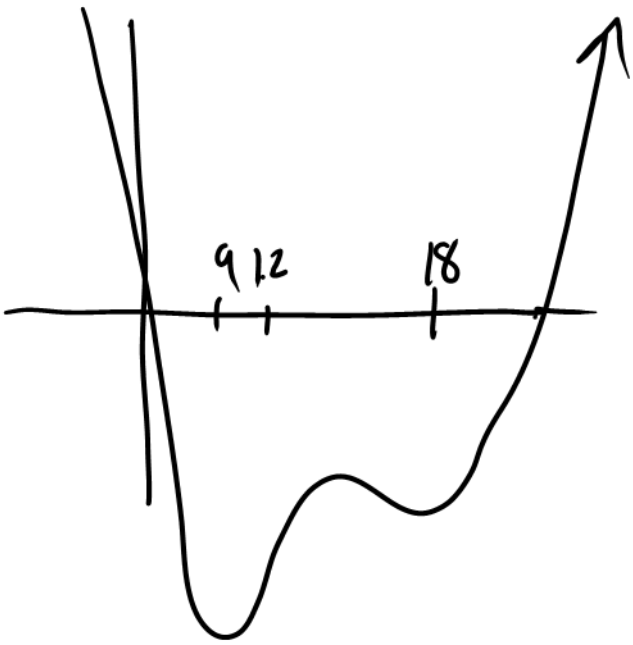
CD: $(-\infty, -1) \cup (0, 1)$

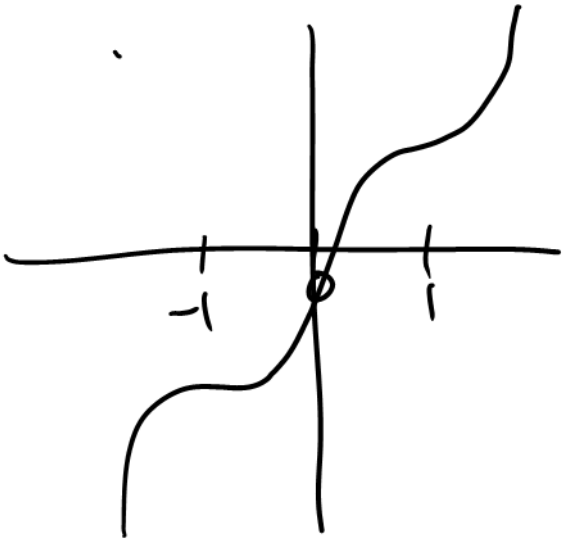
(c) State the locations of any relative max/mins as well as inflection points

No rel. max/mins



Inflection points at $x = -1, 0, 1$


9
12
18


-1
0
1

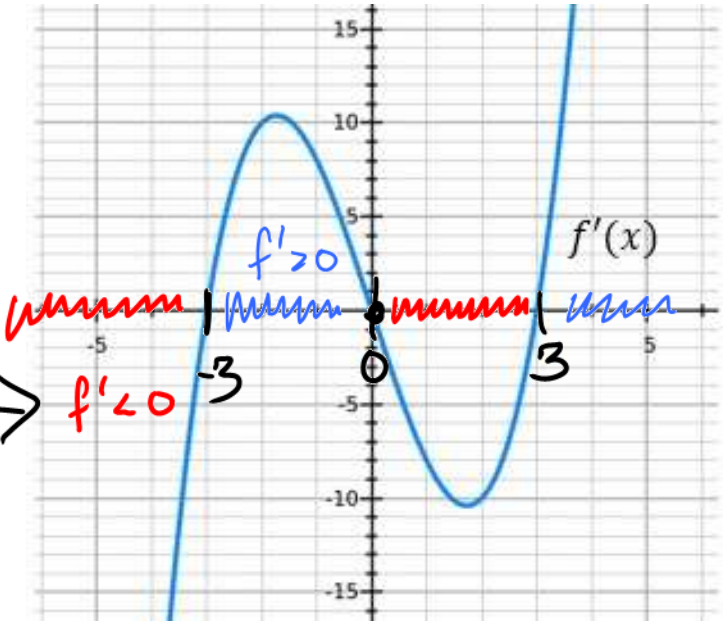
Question 5 of 7

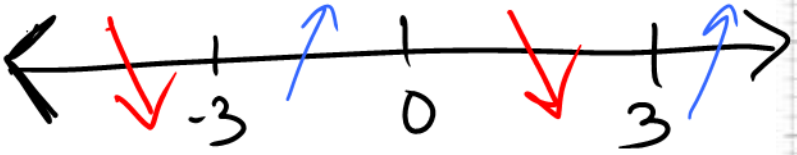
Consider the graph of $f'(x)$, which represents the derivative of the function $f(x)$.

Answer the following questions regarding $f(x)$.

For (a.), (d.), and (e.), if there is more than one answer for a specific question, separate each answer from the following one using a comma. For (b.) and (c.), if there is more than one interval in an answer, separate each interval from the next by typing UNION to enter the ∪ symbol.

For any part, if no answer exists at all, enter NO SOLUTION.





Inc: $(-3, 0) \cup (3, \infty)$

Dec: $(-\infty, -3) \cup (0, 3)$

Rel Min: $-3, 3$ Rel Max: 0

(a.) Critical Number(s) =

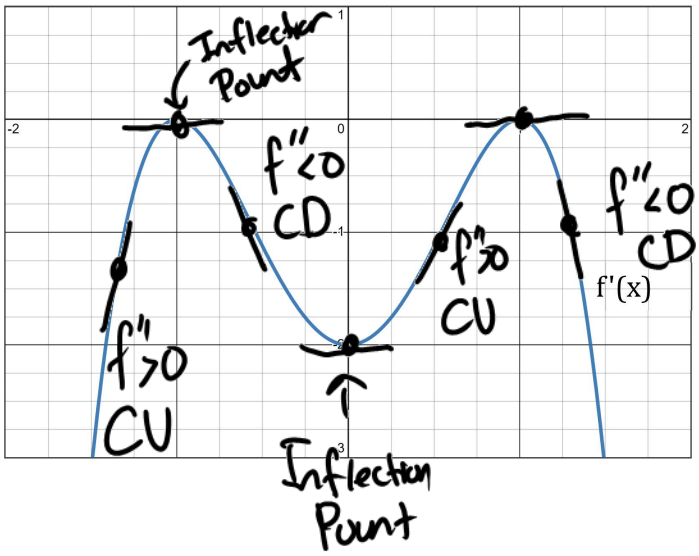
(b.) Increasing Interval(s):

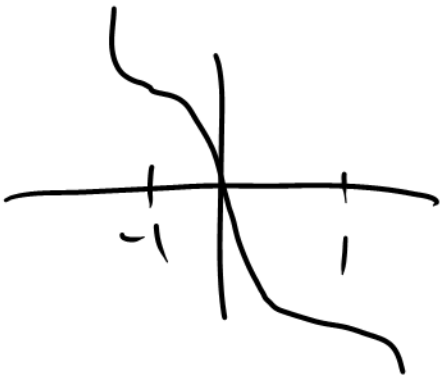
(c.) Decreasing Interval(s):

(d.) Relative Maxima Occur at $x =$

(e.) Relative Minima Occur at $x =$

The following graph shows the derivative $f'(x)$ of the function $f(x)$.





Which of the following statements is true about $f(x)$?

- ~~$f(x)$ is increasing on $(-\infty, -1)$ and $(0, 1)$.~~
- ~~$f(x)$ is concave up on $(-1, 1)$.~~
- ~~$f(x)$ has one relative minimum.~~
- ~~$f(x)$ has two relative maxima.~~
- ~~$f(x)$ has one critical number.~~
- $f(x)$ has three inflection points.