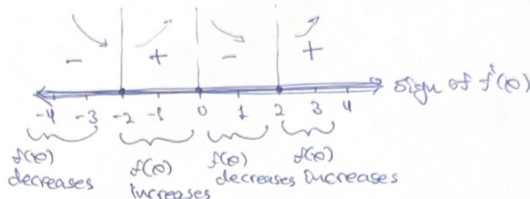
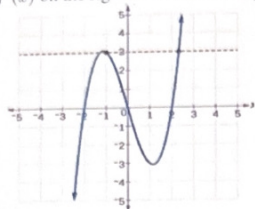


Quiz VI

Ayman Badawi

18/20.

QUESTION 1. (12 points) The graph of $f'(x)$ is given below. Note that $-\infty < x < \infty$, you may draw the sign of $f'(x)$ on the right hand side of the graph.



(i) For what values of x does $f(x)$ increase?

$f(x)$ increases for $x \in [-2, 0] \cup [2, +\infty)$

(ii) For what values of x does $f(x)$ decrease?

$f(x)$ decreases for $x \in (-\infty, -2] \cup [0, 2]$

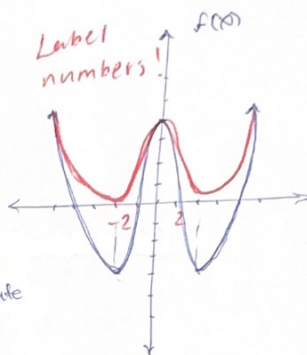
(iii) For what values of x does $f(x)$ have local min values?

$f(x)$ has local minimum values at $x = -2$ and $x = 2$

(iv) For what values of x does $f(x)$ have local max values?

$f(x)$ has local maximum values at $x = 0$

(v) Roughly, sketch the graph of $f(x)$. (on the right hand side)



QUESTION 2. (8 points) Let $f(x) = x^4 - 4x^3 + 6$, where x is in $[-1, 4]$

(a) For what values of x does $f(x)$ have absolute min value?

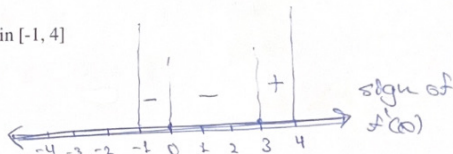
* finding $f'(x)$: $f'(x) = 4x^3 - 12x^2$

$$4x^3 - 12x^2 = 0 \Rightarrow 4x^2(x - 3) = 0$$

$$4x^2 = 0 \Rightarrow x = 0 \quad x - 3 = 0 \Rightarrow x = 3$$

$f(x)$ has absolute minimum values at

$$x = 3 \quad f(3) = -21 \quad \boxed{(3, -21)}$$



(b) For what values of x does $f(x)$ have absolute max value?

$f(x)$ has absolute max values at: $x = -1$ $f(-1) = 1$

$x = 4$ $f(4) = 6$ $(4, 6) \rightarrow$ local max $\boxed{(-1, 1)} \rightarrow$ absolute max

(c) Roughly, sketch the graph of $f(x)$. (on the right hand side)

