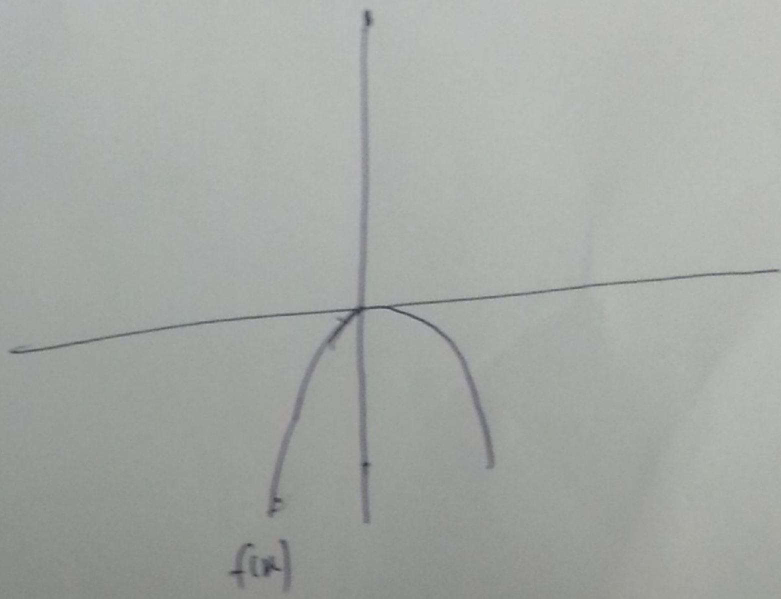
LAB problem 1

(1) $f(x) = -x^2$

$f'(x) = \dfrac{d(-x^2)}{dx}$

$= -2x$



So, when,

$f'(x) = 0$

$-2x = 0$

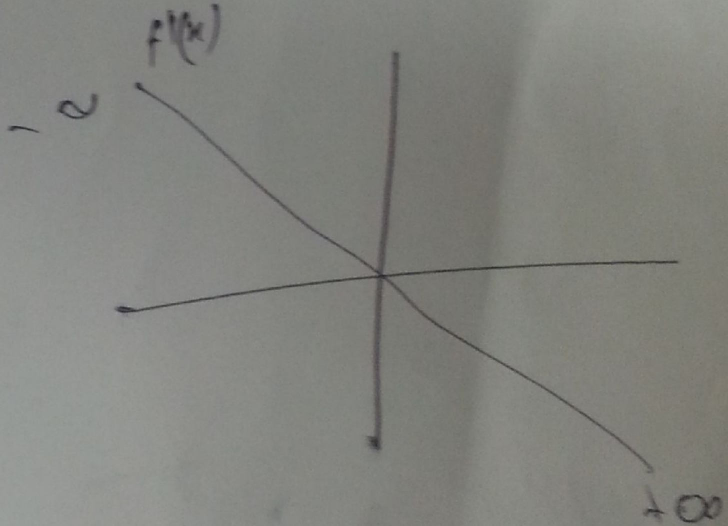
$x = 0$

So, for $x = (-\infty, 0)$

$f'(x) > 0$

So, for $x = (0, \infty)$

$f'(x) < 0$



So,

~~It~~ It increases from $-\infty$ to 0 &

decreases from 0 to ∞

Lab 2
math problem 2

(2) $f(x) = x^2+2x+1$

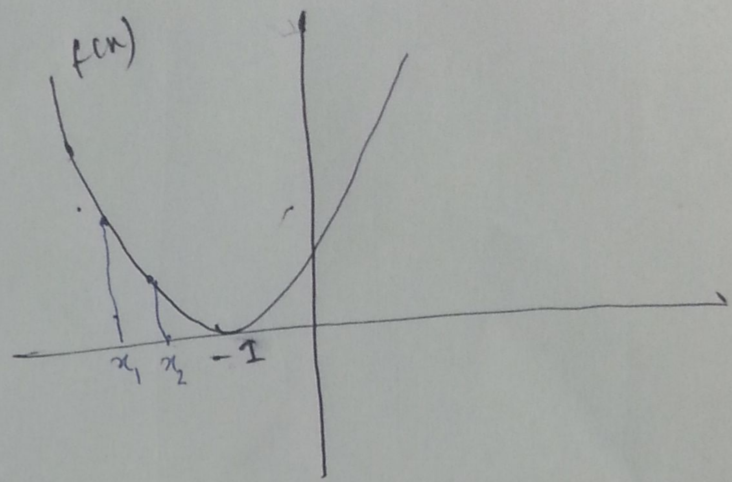
$f'(x) = \frac{d(x^2+2x+1)}{dx}$

$= 2x+2$

So, $f'(x)=0$

$2x+2=0$

$x=-1$



So, when $x = (-\infty$ to $-1)$

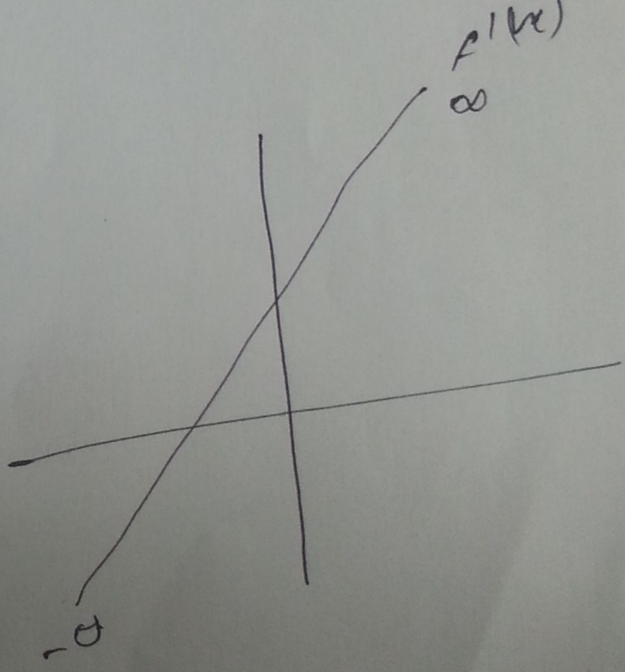
$f'(x) \geq 0$

it increases

So, when $x = (-1$ to $\infty)$

$f'(x) \geq 0$

it increases



Conclusion:- ~~it always increases~~

$f(x)$ is eventually non-decreasing.

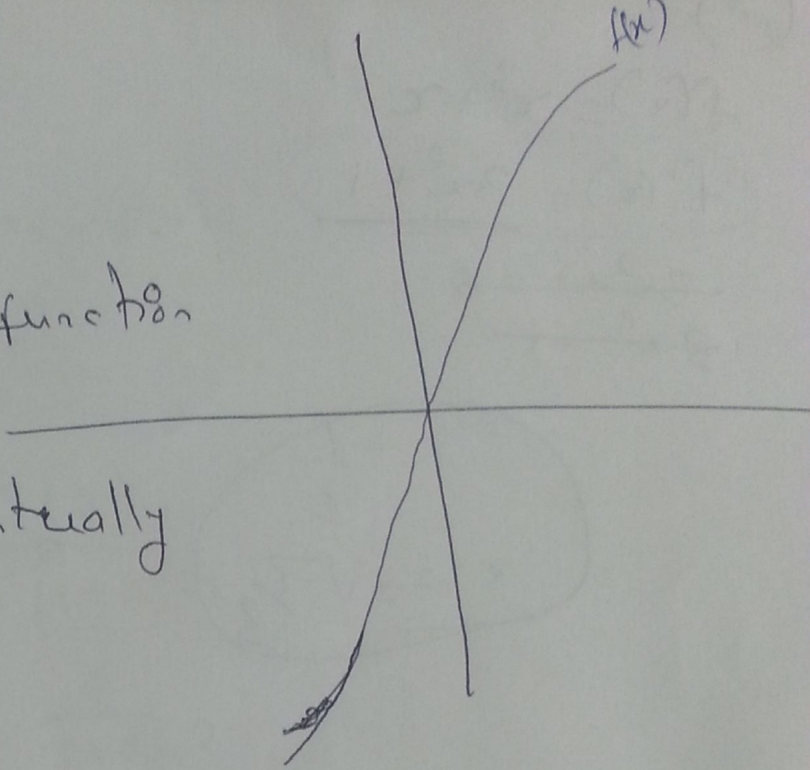
problem 1

(3)

$f(x) = x^3 + x$

$f'(x) = 3x^2 + 1$

Here,
The ~~f~~ derivative of the function f is always positive.
So, the function is eventually increasing



Problem-2:

(1) $f(x) = 2x^2$, $g(x) = x^2+1$

$$\lim_{x \to \infty} \frac{f(x)}{g(x)} = \frac{2x^2}{x^2+1}$$

$$= \lim_{x \to \infty} \frac{x^2(2)}{x^2(1+1/x^2)}$$

$$= \lim_{x \to \infty} \frac{2}{1+1/x^2}$$

$$= 2/_{1+1/\infty}$$

$$= \frac{2}{1+0}$$

$$= 2$$

~~Since~~ $\cancel{\frac{f(x)}{g(x)}}$ Therefore, f grows ~~no faster than g.~~ at the same rate.

problem 2

(2)

$f(x) = x^2 \quad g(x) = x^3$

$$\lim_{x \to \alpha} \frac{f(x)}{g(x)} = \lim_{x \to \alpha} \frac{x^2}{x^3}$$

$$= \lim_{x \to \alpha} \frac{1}{x}$$

$$= 1/\alpha = 0$$

f(x) grows slower than g(x).
i.e f(x) grows no faster than g(x)

(3) $f(x) = 4x+1 \quad g(x) = x^2+1$

$$\lim_{x \to \alpha} \frac{f(x)}{g(x)} = \lim_{x \to \alpha} \frac{4x+1}{x^2+1}$$

$$= \lim_{x \to \alpha} \frac{\cancel{x}(4 + 1/x)}{\cancel{x}(x + 1/x)}$$

$$= \frac{4+0}{\alpha + 0}$$

$$= 4/\alpha = 0$$

f(x) grows slower than g(x)
i.e f(x) grows no faster than g(x).

Problem 4 Group 2

soln

We have given set $S = \{s_0, s_1, s_2, s_3 - - - s_{n-2}\}$

We have subset T such that

$s_{n-1} \in T$ (s_{n-1} belongs to T)

sum of all element of $T = K$.

let us say,

T only have s_{n-1} i.e $T = \{s_{n-1}\}$

$\therefore K = s_{n-1}$

or, $K - s_{n-1} = 0$ ——— (i)

Now, let make another subset T' such that

$T' = T - \{s_{n-1}\}$

$\therefore T' = \{s_{n-1}\} - \{s_{n-1}\}$

$T' = \{\}$ (empty)

let K' be sum of all element of T' (sum of empty set)

$\therefore K' = 0$ [sum of empty set)

or $K' = 0$ ——— (ii)

from (i) & (ii)

$K' = K - s_{n-1}$ Proved