**HW2**

**Amir Livne 201301405**

**Carmel Rabinovitz 302958145**

# 1) Convex sets and functions

### Q1

We define . Now we can define .

So, S is a convex set by definition!

### Q2

We define , meaning, . We want to show that L is convex by definition, meaning :

So, L is convex by definition!

### Q3

In order to show that g is convex by definition we would like to show: :

So, g is convex by definition!

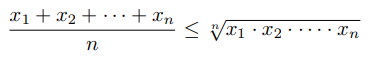
No. we would like to check the Hessian:

From HW1, Q1, we have seen that . So, given a vector , we will get:

And since f is convex, so is f(Ax) (since we can use the transformation y=Ax), it means that is PSD !

### Q4

We would like to show that:



We will use the mean inequality:

Now, we will take exponent on both sides of the equation, and that gives us exactly the desired equality!

### Q5

We define , and we know that are convex functions over , and that by definition of max, to every . So, we will get:

So, if we define , we will get:

Meaning, is convex by definition!