Assignment -3

Que 4: Give an example of a fun $f(x)$ whose epigraph is

(a) half space

The epigraph of $f(x)$ will be a half space if it can be defined as set of pts lying on or above a hyperplane in domain

eg $f(x) = x$ $\quad x \in$ Real number

The epigraph of $f(x)$ is half space defined by all pts (x,t) in R^2 st $t \geq x$.

(b) Norm cone

The epigraph of $f(x)$ is a norm cone if it can be defined as set of pt (x,t) in domain of $f(x)$ st $t \geq \|x\|$.

eg; $f(x) = \|x\|_{L2}$

epi $f(x)$ set of all (x,t) st $t \geq \|x\|$

(c) polyhedron

The epigraph of $f(x)$ is polyhedron if it can be defined as a set of pts lying on or above a finite no of hyperplanes in $f(x)$ domain

Eg $f(x) = \max(x_1, x_2)$ $\quad x_1, x_2 \in \mathbb{R}$

epigraph of $f(x)$ =

(x_1, x_2, t) in $\mathbb{R}^3$ $\quad t \geq \max(x_1, x_2)$