

# CS5580 EndSem 1

StartWriting at S=2:30pm, StopWriting at D=3:25pm, Submit by D+15=3:40pm

**NOTE:** Please write your ROLL NO. clearly on ALL answer sheets. Provide concise justifications. Each question carries 3marks.

1. Consider a convex program, where the domain is entire vector space, there is only one constraint  $g(x) \leq 0$ . Provide an example of  $g$  such that the feasibility set is open.
2. Provide an example of an unbounded convex program whose feasibility set is bounded.
3. Provide an example of a convex program with compact feasibility set that is unsolvable.
4. Give an example of a convex function whose conjugate's conjugate is not the original function.
5. Give an example of a twice differentiable function defined over a convex domain, with psd hessian in interior that is not convex.
6. There is a random variable  $X$  with unit mean and unit variance. Provide a non-trivial lower bound for  $E[e^X]$ .