

1. 10 points Show that the two definitions of Large Deviations are equivalent.
2. 60 points Let  $X$  be a random variable as specified below. Compute

$$\Lambda(\theta) \stackrel{\text{def}}{=} \ln \mathbb{E}[\exp[\theta X]]$$

for all  $\theta \in \mathbb{R}$ . Then compute  $\Lambda^*$ , its Fenchel transform.

- (a) 10 points Gaussian
- (b) 10 points Poisson
- (c) 10 points Geometric
- (d) 10 points Bernoulli
- (e) 10 points Binomial
- (f) 10 points Uniform