

Math 3070/6070 Homework 5

Due: Nov 18th, 2022

- (3.15) In class, we showed that the *Poisson*(λ) distribution is the limit of the negative binomial(r , p) distribution as $r \rightarrow \infty$, $p \rightarrow 1$, $r(1 - p) \rightarrow \lambda$. Show that under these conditions the mgf of the negative binomial converges to that of the Poisson.
- (3.28) Show that each of the following families is an exponential family
 - normal family with either parameter μ or σ known.
 - gamma family with either parameter a or b known or both unknown.
 - beta family with either parameter a or b known or both unknown.
 - Poisson family
 - negative binomial family with r known, $0 < p < 1$.
- (3.33) For each of the following families:
 - Verify that it is an exponential family.
 - Describe the curve on which the θ parameter vector lies.
 - Sketch a graph of the curved parameter space.
 - $n(\theta, \theta)$
 - $n(\theta, a\theta^2)$, a known
- (3.37) Show that if $f(x)$ is a pdf, symmetric about 0, then μ is the median of the location-scale pdf

$$(1/\sigma)f((x - \mu)/\sigma), -\infty < x < \infty.$$