Advanced Statistical Inference I

Homework 3: Common Families of Distributions

Due Date: November 2nd

1. (Engineering Applications)
   - **(a)** Exercise 3.2(c).
   - **(b)** Exercise 3.3.
2. (Business and Law Applications)
   - **(a)** Exercise 3.8.
   - **(b)** Exercise 3.10.
3. (Probability of rare event and statistical reasoning)
   - **(a)** Exercise 3.5.
   - **(b)** Exercise 3.9.
4. (Approximation of probability distribution)
   - **(a)** Exercise 3.11.
   - **(b)** Exercise 3.18.
5. (Hazard rate and modeling)
   - **(a)** Exercise 3.25.
   - **(b)** Exercise 3.26. Also classify those hazard functions in terms of a constant function, an increasing function, or a decreasing function.
6. (Exponential family) Exercise 3.31.
7. (Likelihood ratio and testing) Exercise 3.43.
8. (Useful probability inequalities)
   - **(a)** Exercise 3.45.
   - **(b)** Use (a) to derive a bound on $P(X < cnp)$ where $X \sim binomial(n, p)$ and $0 < c < 1$, a fixed constant.
9. (Stein's Lemma) Exercise 3.49.