

STA360/602 Exam I, Spring 2018

Instructions

- Write your name, NetID, and signature below.
- If you need extra space for any problem, continue on the back of the page.
- Circle if you are in STA 360 or STA 602.

Community Standard

To uphold the Duke Community Standard:

- I will not lie, cheat, or steal in my academic endeavors;
- I will conduct myself honorably in all my endeavors; and
- I will act if the Standard is compromised.

I have adhered to the Duke Community Standard in completing this exam.

Name: _____

NetID: _____

Signature: _____

Score

(For TA use only — leave this section blank.)

1. _____

2. _____

3. _____

4. _____

5. _____

Overall: _____

List of common distributions

$$\text{Geometric}(x|\theta) = \theta(1 - \theta)^x \mathbf{1}(x \in \{0, 1, 2, \dots\}) \text{ for } 0 < \theta < 1$$

$$\text{Bernoulli}(x|\theta) = \theta^x(1 - \theta)^{1-x} \mathbf{1}(x \in \{0, 1\}) \text{ for } 0 < \theta < 1$$

$$\text{Binomial}(x|n, \theta) = \binom{n}{x} \theta^x(1 - \theta)^{n-x} \mathbf{1}(x \in \{0, 1, \dots, n\}) \text{ for } 0 < \theta < 1$$

$$\text{Poisson}(x|\theta) = \frac{e^{-\theta}\theta^x}{x!} \mathbf{1}(x \in \{0, 1, 2, \dots\}) \text{ for } \theta > 0$$

$$\text{Exp}(x|\theta) = \theta e^{-\theta x} \mathbf{1}(x > 0) \text{ for } \theta > 0$$

$$\text{Uniform}(x|a, b) = \frac{1}{b - a} \mathbf{1}(a < x < b) \text{ for } a < b$$

$$\text{Gamma}(x|a, b) = \frac{b^a}{\Gamma(a)} x^{a-1} e^{-bx} \mathbf{1}(x > 0) \text{ for } a, b > 0$$

$$\text{Pareto}(x|\alpha, c) = \frac{\alpha c^\alpha}{x^{\alpha+1}} \mathbf{1}(x > c) \text{ for } \alpha, c > 0$$

$$\text{Beta}(x|a, b) = \frac{1}{B(a, b)} x^{a-1} (1 - x)^{b-1} \mathbf{1}(0 < x < 1) \text{ for } a, b > 0$$

$$\mathcal{N}(x|\mu, \sigma^2) = \frac{1}{\sqrt{2\pi\sigma^2}} \exp\left(-\frac{1}{2\sigma^2}(x - \mu)^2\right) \text{ for } \mu \in \mathbb{R}, \sigma^2 > 0$$

$$\mathcal{N}(x|\mu, \lambda^{-1}) = \sqrt{\frac{\lambda}{2\pi}} \exp\left(-\frac{1}{2}\lambda(x - \mu)^2\right) \text{ for } \mu \in \mathbb{R}, \lambda > 0$$