

# STAT 400: Homework 01

Fall 2017, UIUC

Due: Friday, September 8, 2:00 PM

Please see the [detailed homework policy document](#) for information about homework formatting, submission, and grading.

## Exercise 1

(a) Evaluate the following integral. Do **not** use a calculator or computer, except to check your work.

$$\int_0^{\infty} x e^{-2x} dx$$

(b) Evaluate the following integral. Do **not** use a calculator or computer, except to check your work.

$$\int_0^{\infty} x e^{-x^2} dx$$

## Exercise 2

Find the value  $c$  such that

$$\iint_A c x^2 y^3 dy dx = 1$$

where  $A = \{(x, y) : 0 < x < 1, 0 < y < \sqrt{x}\}$ . Do **not** use a calculator or computer, except to check your work.

## Exercise 3

Suppose  $S = \{2, 3, 4, 5, \dots\}$  and

$$P(k) = c \cdot \frac{2^k}{k!}, \quad k = 2, 3, 4, 5, \dots$$

Find the value of  $c$  that makes this a valid probability distribution.

## Exercise 4

Suppose  $S = \{2, 3, 4, 5, \dots\}$  and

$$P(k) = \frac{6}{3^k}, \quad k = 2, 3, 4, 5, \dots$$

Find  $P(\text{outcome is greater than } 3)$ .

### Exercise 5

Suppose  $P(A) = 0.4$ ,  $P(B') = 0.3$ , and  $P(A \cap B') = 0.1$ .

- (a) Find  $P(A \cup B)$ .
- (b) Find  $P(B' | A)$ .
- (c) Find  $P(B | A')$ .

### Exercise 6

Suppose:

- $P(A) = 0.6$
- $P(B) = 0.5$
- $P(C) = 0.4$
- $P(A \cap B) = 0.3$
- $P(A \cap C) = 0.2$
- $P(B \cap C) = 0.2$
- $P(A \cap B \cap C) = 0.1$

- (a) Find  $P((A \cup B) \cap C')$ .
- (b) Find  $P(A \cup (B \cap C))$ .