

# Bios 660/Bios 672 (3 Credits)

## Probability and Statistical Inference I

### Homework 7

Due: Tue. October 16, 2018 at the Beginning of Class

**Special Note:** when turning in homework, please **staple** the answers into **3 groups**: (a) Questions 1-3; (b) Questions 4-6; (c) Questions 7-9.

1. Problem 8.4 of Gut (1st ed, Page 96): The random variable  $X$  has the property that all moments are equal, i.e.  $E[X^n] = c, \forall n \geq 1$ , for some constant  $c$ . Find the distribution of  $X$ . No proof of uniqueness is required.
2. Problem 8.5 of Gut (1st ed, Page 96): The random variable  $X$  has the property that

$$E[X^n] = \frac{2^n}{n+1}, n = 1, 2, 3, \dots$$

Find some (in fact unique) distribution of  $X$  having these moments.

3. Casella and Berger 2.25
4. Casella and Berger 2.31
5. Casella and Berger 2.32
6. Casella and Berger 2.33
7. Casella and Berger 2.36
8. Casella and Berger 2.38
9. Exercise 4.1 of Gut (1st ed, Page 75):

- (a) If  $X \sim \text{ber}(p)$ , show  $\phi_X(t) = q + pe^{it}$
- (b) If  $X \sim \text{bin}(n, p)$ , show  $\phi_X(t) = (q + pe^{it})^n$
- (c) If  $X \sim \text{geo}(p)$ , show  $\phi_X(t) = p/(1 - qe^{it})$
- (d) If  $X \sim \text{pois}(m)$ , show  $\phi_X(t) = \exp\{m(e^{it} - 1)\}$