

Math 302 Assignment 6

This assignment is due in class on Wednesday November 2.

1. Assume that the height (in inches) of a randomly chosen Canadian female over 21 is a normal r.v. with parameters $\mu = 64$ and $\sigma^2 = 9$.
 - (a) What percentage of Canadian women over 21 are over 5' 10"?
 - (b) Among the women in (a), what percentage are over 6'?
2. If X_1 and X_2 are independent exponential r.v.'s with parameters λ_1 and λ_2 , respectively, show that $\min(X_1, X_2)$ is an exponential r.v. and find its parameter.
3. Mireille is waiting for a bus at 5PM. Either the 329 or the 330 will take her to her destination. The 329 is supposed to arrive on the hour but in fact the arrival time of the next 329 is uniformly distributed between 5PM and 6PM. The 330 is supposed to come every 30 min. starting on the hour but in fact the arrival time of the next 330 is uniformly distributed between 5PM and 5:30PM. Assume the two buses operate independently.
 - (a) Find the probability that Mireille will get on a bus by 5:10PM.
 - (b) Given that Mireille is still waiting at 5:10 what is the probability she will still be waiting at 5:20?
4. If X is exponential r.v. with parameter 1, show that X/λ is an exponential r.v. with parameter λ .
5. Let Z be a standard normal random variable and let $n \geq 1$ be an integer. Show that $E[Z^{n+1}] = nE[Z^{n-1}]$. Use this to find $E[Z^4]$.
6. Assume that a r.v. X has distribution function given by

$$F_X(x) = \begin{cases} 0, & \text{if } x < 0, \\ \frac{1}{2} + x^2, & \text{if } 0 \leq x < \frac{1}{2} \\ \frac{3}{4}, & \text{if } \frac{1}{2} \leq x < 1 \\ 1, & \text{if } x \geq 1 \end{cases}$$

Find:

- (a) $P(X = 0)$.
- (b) $P(\frac{1}{4} < X < \frac{1}{2})$.
- (c) $P(\frac{3}{4} < X \leq 1)$.
- (d) $E(X)$.
- (e) Show that X is not a discrete r.v. Show that X is not a continuous r.v.

Here are some practice problems not to be handed in, but try them before the second midterm.

p. 174 #4.17, 4.19

p. 225 #5.16

p. 227 #5.5

p. 230 #5.9, 5.11, 5.13, 5.14, 5.16.