

Assigned: Wednesday, October 20
Due: Wednesday, October 27

Reading Assignment: This problem set covers the topics of continuous random variables, their expected value, variance and higher moments, and some specific distributions, such as the Exponential, Uniform, Gamma, Weibull, Cauchy, and Beta distributions. The relevant reading material from Ross is Sections 5.2, 5.3, 5.5 (but not 5.5.1), and 5.6 (pp. 190-199, 210-215, 217-223). You are also encouraged to attempt the self-test problems #1, 3, 6, 13 and 18 on pp. 235 – 238 of Ross; their solutions can be found in Appendix B.

The problems you will turn in, and which will be graded are the following:

- 45. Problem 17, p. 230, Ross
- 46. Problem 31, p. 231, Ross
- 47. Problem 33, p. 231, Ross
- 48. Theoretical Exercise 18, p. 233, Ross
- 49. Theoretical Exercise 25, p. 234, Ross
- 50. Let X be a continuous random variable with pdf

$$f_X(x) = \begin{cases} 2(e^{-3x} + e^{-6x}), & \text{if } x \geq 0 \\ 0, & \text{if } x < 0 \end{cases}$$

Compute $E[X]$ and $\text{var}(X)$. Evaluate the probability that $|X| < 2$, that is $P(|X| < 2)$.

- 51. Let X be a random variable with cdf

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

Compute $E[X]$ and $\text{var}(X)$. Also, evaluate the probability that $|X - 1| < 1$, that is $P(|X - 1| < 1)$.

- 52. Let X be a random variable with pdf

$$f_X(x) = ce^{-2|x|}, \quad -\infty < x < \infty$$

where c is a positive constant. Let $Y = 3X - 2$. Obtain the value of c , and compute $E[Y]$ and $\text{var}(Y)$. What is the conditional probability of $Y > 4$ given that $Y > 0$, that is $P(Y > 4|Y > 0)$?