

Homework 8

ME 240: Fundamentals of Instrumentation & Measurement

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1. A continuous random variable x has probability density $f(x)$ given by

$$f(x) = \begin{cases} \frac{3x^2}{35}, & -2 < x < 3 \\ 0, & \text{otherwise.} \end{cases}$$

- (a) (2 points) Show that this function satisfies the requirements of a probability density function.
 - (b) (2 points) Calculate the expected (mean) value of x .
 - (c) (2 points) Calculate the standard deviation of x .
 - (d) (2 points) Calculate the cumulative distribution of x .
 - (e) (3 points) Calculate the value of the cumulative distribution for $x = -2$, $x = 0$, and $x = 3$.
 - (f) (2 points) Interpret your results.
2. In the manufacturing of an electronic parts, the probability of a part being defective is 5%.
- (a) (2 points) What is the probability that, in a batch of 100 parts, 2 will be defective?
 - (b) (2 points) What is the probability that, in a batch of 100 parts, 5 will be defective?
 - (c) (2 points) What is the probability that, in a batch of 100 parts, 10 will be defective?
3. (4 points) A manufacturer needs to make 50 products. The probability that the main component is defective is 5%. If the manufacturer orders 55 components, what is the probability that there are 50 or more good components so that all the products can be completed?