Stat 50 – Worksheet #6: Probability Density Functions and Expectation

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1. An auto repair shop only does tune ups, and it can perform no more than 3 tune ups in a day. Let X = the number of automobiles tuned up on a randomly selected day. Suppose X has the probability distribution shown below.

x	0	1	2	3
p(x)	0.20	0.10	0.30	?

   (a) What is the probability the shop tunes up 3 automobiles on a randomly selected day?

   (b) What is the probability the shop performs at least 2 tune ups on a random day?

   (c) Compute the mean and standard deviation of the number of tune ups in a day at this shop.

   (d) Estimate the number of tune ups the shop would do in a year (assuming they are open every day).

2. The cumulative distribution function of a discrete random variable X is given below.

x	0	1	2	3	4
F(x)	0.1	0.4	0.95	0.99	1.00

   Calculate

   (a) $P(X \leq 3)$

   (b) $P(X \geq 3)$

   (c) $P(X = 2)$

3. The pdf of a continuous RV X is given by:

$$f(x) = \begin{cases} 3(1-x)^2 & \text{if } 0 < x < 1 \\ 0 & \text{otherwise} \end{cases}$$

   (a) Compute $P(X < 0.5)$

   (b) Find μ_x.

   (c) Calculate σ_x^2

   (d) Determine the median of X.