

- [3] **1.** Suppose that the intersection of Hillside and Shelbourne has an average rate of 5 accidents per week. What is the probability that in a 3 week period there are between 13 and 19 accidents (inclusive)?

Answer

- [3] **2.** The probability that a new drug lowers a patient's cholesterol level is 80%. A doctor prescribe the new drug to 20 patients. What is the probability that at least 15 of them will have their cholesterol level lowered?

Answer

(Questions 3 and 4 refer to the following setup)

Define a continuous random variable X with probability density function,

$$f(x) = \begin{cases} \frac{7x+8}{2x^9}, & x \geq 1 \\ 0, & \text{otherwise.} \end{cases}$$

- [3] **3.** Calculate μ_X .

Answer

- [3] **4.** Given $\int_1^\infty \frac{7x+8}{2x^7} dx = \frac{41}{30}$, determine the value of σ_X to 3 decimal places. [If you did not get an answer to question 3, you will receive part marks for using an incorrect value of $E(X) = 1$.]

Answer

- [3] 5. The ideal size of a first-year class at a particular college is 150 students. The college, knowing from past experience that only 30 % of those accepted for admission will actually attend, uses a policy of approving the application of 450 students. Use an appropriate approximation to compute the probability that at most 150 first-year students will attend this college.

Answer

- [3] 6. At BB Bank, the amount of time that a customer spends being served by a teller is an exponential random variable with mean 5 minutes. If there is a customer in service when you enter the bank, what is the probability that they will still be with the teller after an additional 4 minutes?

Answer

(Questions 7 and 8 refer to the following setup)

The following joint probability table $f(x, y)$ gives the relationship between number of goals scored (X) and number of penalties assessed (Y) for players in a minor hockey league game.

skip question 7

$f(x, y)$		y		
		0	1	2
x	0	0.22	0.32	0.26
	1	0.08	0.00	0.04
	2	0.00	0.08	0.00

- [3] 7. Determine the probability a player had more penalties assessed than goals scored.

Answer

- [3] 8. Given $E(X) = 0.28$ and $E(Y) = 1$, compute $COV(X, Y)$.

Answer

(Question 9) The lifetime of a laser diode is normally distributed with a mean of 40,000 hours and a standard deviation of 6200 hours.

- (a) [**2 marks**] If a randomly selected laser diode is found to have survived at least 30,500 hours, then what is the probability that it will last at most 50,000 hours?

Recall: The lifetime of a laser diode is normally distributed with a mean of 40,000 hours and a standard deviation of 6200 hours.

- (b) [**2 marks**] Find the lifetime d so that 85% of laser diodes have a lifetime longer than d .
- (c) [**2 marks**] For a particular application, diodes that last a long time are needed. In particular, the diodes need to last at least 49,000 hours. If 15 diodes are randomly selected, what is the probability that exactly 2 of them will last long enough?