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Q1. Each year, rating are compiled concerning the performance of new cars during the first 90 days of use. The cars have been catergorized according to whether a car needs warrantly related repair or not (yes or no) and the country in which the company manufacturing a car is either Japan or Malaysia. Based on data collected for the last two years, the probability that a new car needs a warrantly repair is 0.04. The probability that the car was manufactutred by Malaysia is 0.60. The probability that a new car needs a warrantly repair and was manufactured in Malaysia is 0.025.

a) Construct a 2-way frequency table for the two random variables.

b) Using the frequency table what is the probability that a new car selected at random need a warrantly related repai given that it is manufactured in Japan.

c) Give an example for a joint event in the frequency table.

d) Find the probability of the joint event you defined in **(c).**

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Q2:

a) The random variable Y is defined such that $Y = 0.6X_1 + 0.4X_2$ where X_1 = weight of boxes manufactured and X_2 = volume of the same boxes. If $E(X_1) = 5,\ E(X_1^2) = 34, E(X_2) = 3, E(X_2^2) = 18$ and $Cov(X_1, X_2) = 0.8$ find the standard deviation of Y.

b) If the pdf of random variable is such that $f(x)=\begin{cases} x+1 & \text{for } -1 \le x < 0 \\ 1-x & \text{for } 0 < x < 1 \\ 0 & \text{otherwise} \end{cases}$, find the cumulative distribution function, $F_X(x)$.

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Q3. Solve the differential equation $\frac{dy}{dx} - \frac{y}{x} = 1 - e^{-x}, y(1) = 0$ representing $y = y(x)$ as an integral.

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Q4. Let $y(x)$ be the solution to the differential equation in Q3. Find $\lim_{x\to\infty} \frac{y(x)}{x}$.

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Q5. In the calculation of the volume of a cube of nominal size $10''$, the uncertainty in the measurement of each side is 12%. The uncertainty in the measurement of the volume would be

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Q6. The root of the equation $f(x) = 0$ is found by using secant method. Given one of the initial estimates is $x_0 = 3$ and $f(3) = 5$, and the angle the secant makes with the function $f(x)$ is 57^0 , the next estimate of the root, x_1, is