IMM - DTU

02405 Probability
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BFN/bfn

We introduce the events

We introduce the events M_i

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Question a) Using the Rule of Average Conditional Probabilities page

We introduce the events M_i that the transistor is produced on machine i.

Question a) Using the Rule of Average Conditional Probabilities page 41 we get

We introduce the events M_i that the transistor is produced on machine i.

Question a) Using the Rule of Average Conditional Probabilities page 41 we get

$$\begin{aligned} P(X \geq 200) &= P(X \geq 200|M_1)P(M_1) + P(X \geq 200|M_2)P(M_2) \\ &= e^{-\frac{200}{100}}\frac{4}{12} + e^{-\frac{200}{200}}\frac{8}{12} \\ &= 0.2904 \end{aligned}$$

Question b) Similarly

$$E(X) = 100 \cdot \frac{1}{3} + 200 \cdot \frac{2}{3} = \frac{500}{3}$$

Question c) To find the variance we use the Computational Formula for Variance page 261. We introduce X_i to be the lifetime of a transistor produced by machine i. We use the Computational Formula inversely to get

$$E(X_i^2) = V(X_i) + (E(X_i))^2 = \frac{2}{\lambda_i^2}$$

where $E(X_i) = \frac{1}{\lambda_i}$ is the mean lifetime of a transistor produced on machine i.

$$E(X^2) = E(X_1^2)\frac{1}{3} + E(X_2^2)\frac{2}{3} = 6 \cdot 100^2$$

Finally

$$Var(X) = 6 \cdot 100^2 - \left(\frac{500}{3}\right)^2 = \frac{29}{9} \cdot 100^2$$

We introduce the events M_i that the transistor is produced on machine i.

Question a) Using the Rule of Average Conditional Probabilities page 41 we get

$$\begin{aligned} P(X \geq 200) & \quad P(M_1) + P(X \geq 200|M_2)P(M_2) \\ & = e^{-\frac{200}{100}}\frac{4}{12} + e^{-\frac{200}{200}}\frac{8}{12} \\ & = 0.2904 \end{aligned}$$

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$$E(X) = 100 \cdot \frac{1}{3} + 200 \cdot \frac{2}{3} = \frac{500}{3}$$

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We introduce the events M_i that the transistor is produced on machine i.

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$$\begin{aligned} P(X \geq 200) &= + P(X \geq 200|M_2)P(M_2) \\ &= e^{-\frac{200}{100}}\frac{4}{12} + e^{-\frac{200}{200}}\frac{8}{12} \\ &= 0.2904 \end{aligned}$$

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We introduce the events M_i that the transistor is produced on machine i.

Question a) Using the Rule of Average Conditional Probabilities page 41 we get

$$P(X \geq 200)$$

$$= 0.2904$$

Question b) Similarly

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Question c) To find the variance we use the Computational Formula for Variance page 261. We introduce X_i to be the lifetime of a transistor produced by machine i. We use the Computational Formula inversely to get

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$$P(X \geq 200)$$

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Question a) Using the Rule of Average Conditional Probabilities page 41 we get

$$\begin{aligned} P(X \geq 200) &= P(X \geq 200|M_1)P(M_1) + P(X \geq 200|M_2)P(M_2) \\ &= e^{-\frac{200}{100}}\frac{4}{12} + e^{-\frac{200}{200}}\frac{8}{12} \\ &= 0.2904 \end{aligned}$$

Question b) Similarly

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Question b) Similarly

$$E(X)$$

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Question b) Similarly

$$E(X) = 100$$

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Question b) Similarly

$$E(X) = 100 \cdot \frac{1}{3}$$

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Question b) Similarly

$$E(X) = 100 \cdot \frac{1}{3} + 200 \cdot \frac{2}{3}$$

We introduce the events M_i that the transistor is produced on machine i.

Question a) Using the Rule of Average Conditional Probabilities page 41 we get

$$\begin{aligned} P(X \geq 200) &= P(X \geq 200|M_1)P(M_1) + P(X \geq 200|M_2)P(M_2) \\ &= e^{-\frac{200}{100}}\frac{4}{12} + e^{-\frac{200}{200}}\frac{8}{12} \\ &= 0.2904 \end{aligned}$$

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$$E(X) = 100 \cdot \frac{1}{3} + 200 \cdot \frac{2}{3} = \frac{500}{3}$$

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Question b) Similarly

$$E(X) = 100 \cdot \frac{1}{3} + 200 \cdot \frac{2}{3} = \frac{500}{3}$$

Question c) To find the variance we use

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Question c) To find the variance we use the Computational Formula for Variance page

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We introduce the events M_i that the transistor is produced on machine i.

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Question b) Similarly

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Question c) To find the variance we use the Computational Formula for Variance page 261. We introduce X_i

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Question b) Similarly

$$E(X) = 100 \cdot \frac{1}{3} + 200 \cdot \frac{2}{3} = \frac{500}{3}$$

Question c) To find the variance we use the Computational Formula for Variance page 261. We introduce X_i to be the lifetime

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Question b) Similarly

$$E(X) = 100 \cdot \frac{1}{3} + 200 \cdot \frac{2}{3} = \frac{500}{3}$$

Question c) To find the variance we use the Computational Formula for Variance page 261. We introduce X_i to be the lifetime of a transistor

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Question c) To find the variance we use the Computational Formula for Variance page 261. We introduce X_i to be the lifetime of a transistor produced by machine i. We use the Computational Formula inversely to get

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Question c) To find the variance we use the Computational Formula for Variance page 261. We introduce X_i to be the lifetime of a transistor produced by machine i. We use the Computational Formula inversely to get

$$E(X_i^2) = V(X_i)$$

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$$E(X_i^2) = V(X_i) + (E(X_i))^2$$

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where $E(X_i) = \frac{1}{\lambda_i}$ is the mean lifetime of a transistor produced on machine i.

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$$E(X^2)$$

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where $E(X_i) = \frac{1}{\lambda_i}$ is the mean lifetime of a transistor produced on machine i.

$$E(X^2) = E(X_1^2)$$

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Question c) To find the variance we use the Computational Formula for Variance page 261. We introduce X_i to be the lifetime of a transistor produced by machine i. We use the Computational Formula inversely to get

$$E(X_i^2) = V(X_i) + (E(X_i))^2 = \frac{2}{\lambda_i^2}$$

where $E(X_i) = \frac{1}{\lambda_i}$ is the mean lifetime of a transistor produced on machine i.

$$E(X^2) = E(X_1^2)\frac{1}{3}$$

We introduce the events M_i that the transistor is produced on machine i.

Question a) Using the Rule of Average Conditional Probabilities page 41 we get

$$\begin{aligned} P(X \geq 200) &= P(X \geq 200|M_1)P(M_1) + P(X \geq 200|M_2)P(M_2) \\ &= e^{-\frac{200}{100}}\frac{4}{12} + e^{-\frac{200}{200}}\frac{8}{12} \\ &= 0.2904 \end{aligned}$$

Question b) Similarly

$$E(X) = 100 \cdot \frac{1}{3} + 200 \cdot \frac{2}{3} = \frac{500}{3}$$

Question c) To find the variance we use the Computational Formula for Variance page 261. We introduce X_i to be the lifetime of a transistor produced by machine i. We use the Computational Formula inversely to get

$$E(X_i^2) = V(X_i) + (E(X_i))^2 = \frac{2}{\lambda_i^2}$$

where $E(X_i) = \frac{1}{\lambda_i}$ is the mean lifetime of a transistor produced on machine i.

$$E(X^2) = E(X_1^2)\frac{1}{3} + E(X_2^2)\frac{2}{3}$$

We introduce the events M_i that the transistor is produced on machine i.

Question a) Using the Rule of Average Conditional Probabilities page 41 we get

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$$E(X) = 100 \cdot \frac{1}{3} + 200 \cdot \frac{2}{3} = \frac{500}{3}$$

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$$E(X_i^2) = V(X_i) + (E(X_i))^2 = \frac{2}{\lambda_i^2}$$

where $E(X_i) = \frac{1}{\lambda_i}$ is the mean lifetime of a transistor produced on machine i.

$$E(X^2) = E(X_1^2)\frac{1}{3} + E(X_2^2)\frac{2}{3} = 6 \cdot 100^2$$

We introduce the events M_i that the transistor is produced on machine i.

Question a) Using the Rule of Average Conditional Probabilities page 41 we get

$$\begin{aligned} P(X \geq 200) &= P(X \geq 200|M_1)P(M_1) + P(X \geq 200|M_2)P(M_2) \\ &= e^{-\frac{200}{100}}\frac{4}{12} + e^{-\frac{200}{200}}\frac{8}{12} \\ &= 0.2904 \end{aligned}$$

Question b) Similarly

$$E(X) = 100 \cdot \frac{1}{3} + 200 \cdot \frac{2}{3} = \frac{500}{3}$$

Question c) To find the variance we use the Computational Formula for Variance page 261. We introduce X_i to be the lifetime of a transistor produced by machine i. We use the Computational Formula inversely to get

$$E(X_i^2) = V(X_i) + (E(X_i))^2 = \frac{2}{\lambda_i^2}$$

where $E(X_i) = \frac{1}{\lambda_i}$ is the mean lifetime of a transistor produced on machine i.

$$E(X^2) = E(X_1^2)\frac{1}{3} + E(X_2^2)\frac{2}{3} = 6 \cdot 100^2$$

Finally

We introduce the events M_i that the transistor is produced on machine i.

Question a) Using the Rule of Average Conditional Probabilities page 41 we get

$$\begin{aligned} P(X \geq 200) &= P(X \geq 200|M_1)P(M_1) + P(X \geq 200|M_2)P(M_2) \\ &= e^{-\frac{200}{100}}\frac{4}{12} + e^{-\frac{200}{200}}\frac{8}{12} \\ &= 0.2904 \end{aligned}$$

Question b) Similarly

$$E(X) = 100 \cdot \frac{1}{3} + 200 \cdot \frac{2}{3} = \frac{500}{3}$$

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$$E(X_i^2) = V(X_i) + (E(X_i))^2 = \frac{2}{\lambda_i^2}$$

where $E(X_i) = \frac{1}{\lambda_i}$ is the mean lifetime of a transistor produced on machine i.

$$E(X^2) = E(X_1^2)\frac{1}{3} + E(X_2^2)\frac{2}{3} = 6 \cdot 100^2$$

Finally

$$Var(X)$$

We introduce the events M_i that the transistor is produced on machine i.

Question a) Using the Rule of Average Conditional Probabilities page 41 we get

$$\begin{aligned} P(X \geq 200) &= P(X \geq 200|M_1)P(M_1) + P(X \geq 200|M_2)P(M_2) \\ &= e^{-\frac{200}{100}}\frac{4}{12} + e^{-\frac{200}{200}}\frac{8}{12} \\ &= 0.2904 \end{aligned}$$

Question b) Similarly

$$E(X) = 100 \cdot \frac{1}{3} + 200 \cdot \frac{2}{3} = \frac{500}{3}$$

Question c) To find the variance we use the Computational Formula for Variance page 261. We introduce X_i to be the lifetime of a transistor produced by machine i. We use the Computational Formula inversely to get

$$E(X_i^2) = V(X_i) + (E(X_i))^2 = \frac{2}{\lambda_i^2}$$

where $E(X_i) = \frac{1}{\lambda_i}$ is the mean lifetime of a transistor produced on machine i.

$$E(X^2) = E(X_1^2)\frac{1}{3} + E(X_2^2)\frac{2}{3} = 6 \cdot 100^2$$

Finally

$$Var(X) = 6 \cdot 100^2$$

We introduce the events M_i that the transistor is produced on machine i.

Question a) Using the Rule of Average Conditional Probabilities page 41 we get

$$\begin{aligned} P(X \geq 200) &= P(X \geq 200|M_1)P(M_1) + P(X \geq 200|M_2)P(M_2) \\ &= e^{-\frac{200}{100}}\frac{4}{12} + e^{-\frac{200}{200}}\frac{8}{12} \\ &= 0.2904 \end{aligned}$$

Question b) Similarly

$$E(X) = 100 \cdot \frac{1}{3} + 200 \cdot \frac{2}{3} = \frac{500}{3}$$

Question c) To find the variance we use the Computational Formula for Variance page 261. We introduce X_i to be the lifetime of a transistor produced by machine i. We use the Computational Formula inversely to get

$$E(X_i^2) = V(X_i) + (E(X_i))^2 = \frac{2}{\lambda_i^2}$$

where $E(X_i) = \frac{1}{\lambda_i}$ is the mean lifetime of a transistor produced on machine i.

$$E(X^2) = E(X_1^2)\frac{1}{3} + E(X_2^2)\frac{2}{3} = 6 \cdot 100^2$$

Finally

$$Var(X) = 6 \cdot 100^2 - \left(\frac{500}{3}\right)^2$$

We introduce the events M_i that the transistor is produced on machine i.

Question a) Using the Rule of Average Conditional Probabilities page 41 we get

$$\begin{aligned} P(X \geq 200) &= P(X \geq 200|M_1)P(M_1) + P(X \geq 200|M_2)P(M_2) \\ &= e^{-\frac{200}{100}}\frac{4}{12} + e^{-\frac{200}{200}}\frac{8}{12} \\ &= 0.2904 \end{aligned}$$

Question b) Similarly

$$E(X) = 100 \cdot \frac{1}{3} + 200 \cdot \frac{2}{3} = \frac{500}{3}$$

Question c) To find the variance we use the Computational Formula for Variance page 261. We introduce X_i to be the lifetime of a transistor produced by machine i. We use the Computational Formula inversely to get

$$E(X_i^2) = V(X_i) + (E(X_i))^2 = \frac{2}{\lambda_i^2}$$

where $E(X_i) = \frac{1}{\lambda_i}$ is the mean lifetime of a transistor produced on machine i.

$$E(X^2) = E(X_1^2)\frac{1}{3} + E(X_2^2)\frac{2}{3} = 6 \cdot 100^2$$

Finally

$$Var(X) = 6 \cdot 100^2 - \left(\frac{500}{3}\right)^2 = \frac{29}{9} \cdot 100^2$$