

IMM - DTU

02405 Probability

2003-11-12

BFN/bfn

Question a) Consider the area of the support for the density to get

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$$P(X > 1)$$

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$$P(X > 1) = \frac{5}{6}$$

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$$P(X > 1) = \frac{\frac{5}{2}}{6} = \frac{5}{12}$$

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$$P(X > 1) = \frac{5}{6} = \frac{5}{12} \quad P(X \leq 1) = \frac{7}{12}$$

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$$P(X > 1) = \frac{5}{6} = \frac{5}{12} \quad P(X \leq 1) = \frac{7}{12}$$

or integration of

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$$P(X > 1) = \frac{\frac{5}{2}}{6} = \frac{5}{12} \quad P(X \leq 1) = \frac{7}{12}$$

or integration of

$$\int_0^1 \int_x^4 \frac{1}{6} dy dx$$

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$$\int_0^1 \int_x^4 \frac{1}{6} dy dx = \int_0^1 \frac{4-x}{6} dx$$

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Question b)

$$\int_1^2$$

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$$\int_1^2 \int_x^{x^2}$$

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$$\int_1^2 \int_x^{x^2} \frac{1}{6} dy dx$$

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Question b)

$$\int_1^2 \int_x^{x^2} \frac{1}{6} dy dx = \frac{1}{6} \int_1^2 (x^2 - x) dx$$

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$$\int_1^2 \int_x^{x^2} \frac{1}{6} dy dx = \frac{1}{6} \int_1^2 (x^2 - x) dx = \frac{1}{6} \left[\frac{1}{3} x^3 - \frac{1}{2} x^2 \right]_{x=1}^{x=2}$$

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Question b)

$$\int_1^2 \int_x^{x^2} \frac{1}{6} dy dx = \frac{1}{6} \int_1^2 (x^2 - x) dx = \frac{1}{6} \left[\frac{1}{3} x^3 - \frac{1}{2} x^2 \right]_{x=1}^{x=2} = \frac{5}{36}$$

(note that $x^2 < x$ for $0 < x < 1$)