IMM - DTU

02405 Probability
2003-10-16
BFN/bfn

Question a) From the definition of the cumulative distribution function page

Question a) From the definition of the cumulative distribution function page 313 we get

Question a) From the definition of the cumulative distribution function page 313 we get

$$P\left(X \geq \frac{1}{2}\right)$$

Question a) From the definition of the cumulative distribution function page 313 we get

$$P\left(X \geq \frac{1}{2}\right) = 1 - P\left(X < \frac{1}{2}\right)$$

Question a) From the definition of the cumulative distribution function page 313 we get

$$P\left(X \geq \frac{1}{2}\right) = 1 - P\left(X < \frac{1}{2}\right) = 1 - P\left(X \leq \frac{1}{2}\right)$$

IMM - DTU

02405 Probability
2003-10-16
BFN/bfn

Question a) From the definition of the cumulative distribution function page 313 we get

$$P\left(X \geq \frac{1}{2}\right) = 1 - P\left(X < \frac{1}{2}\right) = 1 - P\left(X \leq \frac{1}{2}\right)$$

where the last equality is true for

Question a) From the definition of the cumulative distribution function page 313 we get

$$P\left(X \geq \frac{1}{2}\right) = 1 - P\left(X < \frac{1}{2}\right) = 1 - P\left(X \leq \frac{1}{2}\right)$$

where the last equality is true for continuous distributions.

Question a) From the definition of the cumulative distribution function page 313 we get

$$P\left(X \geq \frac{1}{2}\right) = 1 - P\left(X < \frac{1}{2}\right) = 1 - P\left(X \leq \frac{1}{2}\right)$$

where the last equality is true for continuous distributions.

$$P\left(X \geq \frac{1}{2}\right)$$

Question a) From the definition of the cumulative distribution function page 313 we get

$$P\left(X \geq \frac{1}{2}\right) = 1 - P\left(X < \frac{1}{2}\right) = 1 - P\left(X \leq \frac{1}{2}\right)$$

where the last equality is true for continuous distributions.

$$P\left(X \geq \frac{1}{2}\right) = 1 - P\left(X \leq \frac{1}{2}\right)$$

Question a) From the definition of the cumulative distribution function page 313 we get

$$P\left(X \geq \frac{1}{2}\right) = 1 - P\left(X < \frac{1}{2}\right) = 1 - P\left(X \leq \frac{1}{2}\right)$$

where the last equality is true for continuous distributions.

$$P\left(X \geq \frac{1}{2}\right) = 1 - P\left(X \leq \frac{1}{2}\right) = 1 - F\left(\frac{1}{2}\right)$$

Question a) From the definition of the cumulative distribution function page 313 we get

$$P\left(X \geq \frac{1}{2}\right) = 1 - P\left(X < \frac{1}{2}\right) = 1 - P\left(X \leq \frac{1}{2}\right)$$

where the last equality is true for continuous distributions.

$$P\left(X \geq \frac{1}{2}\right) = 1 - P\left(X \leq \frac{1}{2}\right) = 1 - F\left(\frac{1}{2}\right) = \frac{7}{8}$$

Question a) From the definition of the cumulative distribution function page 313 we get

$$P\left(X \geq \frac{1}{2}\right) = 1 - P\left(X < \frac{1}{2}\right) = 1 - P\left(X \leq \frac{1}{2}\right)$$

where the last equality is true for continuous distributions.

$$P\left(X \geq \frac{1}{2}\right) = 1 - P\left(X \leq \frac{1}{2}\right) = 1 - F\left(\frac{1}{2}\right) = \frac{7}{8}$$

Question b) The density is the

Question a) From the definition of the cumulative distribution function page 313 we get

$$P\left(X \geq \frac{1}{2}\right) = 1 - P\left(X < \frac{1}{2}\right) = 1 - P\left(X \leq \frac{1}{2}\right)$$

where the last equality is true for continuous distributions.

$$P\left(X \geq \frac{1}{2}\right) = 1 - P\left(X \leq \frac{1}{2}\right) = 1 - F\left(\frac{1}{2}\right) = \frac{7}{8}$$

Question b) The density is the first derivative of the

Question a) From the definition of the cumulative distribution function page 313 we get

$$P\left(X \geq \frac{1}{2}\right) = 1 - P\left(X < \frac{1}{2}\right) = 1 - P\left(X \leq \frac{1}{2}\right)$$

where the last equality is true for continuous distributions.

$$P\left(X \geq \frac{1}{2}\right) = 1 - P\left(X \leq \frac{1}{2}\right) = 1 - F\left(\frac{1}{2}\right) = \frac{7}{8}$$

Question b) The density is the first derivative of the CDF for a

Question a) From the definition of the cumulative distribution function page 313 we get

$$P\left(X \geq \frac{1}{2}\right) = 1 - P\left(X < \frac{1}{2}\right) = 1 - P\left(X \leq \frac{1}{2}\right)$$

where the last equality is true for continuous distributions.

$$P\left(X \geq \frac{1}{2}\right) = 1 - P\left(X \leq \frac{1}{2}\right) = 1 - F\left(\frac{1}{2}\right) = \frac{7}{8}$$

Question b) The density is the first derivative of the CDF for a continuous distribution (page

Question a) From the definition of the cumulative distribution function page 313 we get

$$P\left(X \geq \frac{1}{2}\right) = 1 - P\left(X < \frac{1}{2}\right) = 1 - P\left(X \leq \frac{1}{2}\right)$$

where the last equality is true for continuous distributions.

$$P\left(X \geq \frac{1}{2}\right) = 1 - P\left(X \leq \frac{1}{2}\right) = 1 - F\left(\frac{1}{2}\right) = \frac{7}{8}$$

Question b) The density is the first derivative of the CDF for a continuous distribution (page 313), thus

Question a) From the definition of the cumulative distribution function page 313 we get

$$P\left(X \geq \frac{1}{2}\right) = 1 - P\left(X < \frac{1}{2}\right) = 1 - P\left(X \leq \frac{1}{2}\right)$$

where the last equality is true for continuous distributions.

$$P\left(X \geq \frac{1}{2}\right) = 1 - P\left(X \leq \frac{1}{2}\right) = 1 - F\left(\frac{1}{2}\right) = \frac{7}{8}$$

Question b) The density is the first derivative of the CDF for a continuous distribution (page 313), thus

$$f(x)$$

Question a) From the definition of the cumulative distribution function page 313 we get

$$P\left(X \geq \frac{1}{2}\right) = 1 - P\left(X < \frac{1}{2}\right) = 1 - P\left(X \leq \frac{1}{2}\right)$$

where the last equality is true for continuous distributions.

$$P\left(X \geq \frac{1}{2}\right) = 1 - P\left(X \leq \frac{1}{2}\right) = 1 - F\left(\frac{1}{2}\right) = \frac{7}{8}$$

Question b) The density is the first derivative of the CDF for a continuous distribution (page 313), thus

$$f(x) = \frac{\mathrm{d}F(x)}{\mathrm{d}x}$$

Question a) From the definition of the cumulative distribution function page 313 we get

$$P\left(X \geq \frac{1}{2}\right) = 1 - P\left(X < \frac{1}{2}\right) = 1 - P\left(X \leq \frac{1}{2}\right)$$

where the last equality is true for continuous distributions.

$$P\left(X \geq \frac{1}{2}\right) = 1 - P\left(X \leq \frac{1}{2}\right) = 1 - F\left(\frac{1}{2}\right) = \frac{7}{8}$$

Question b) The density is the first derivative of the CDF for a continuous distribution (page 313), thus

$$f(x) = \frac{\mathsf{d}F(x)}{\mathsf{d}x} = 3x^2$$

Question a) From the definition of the cumulative distribution function page 313 we get

$$P\left(X \geq \frac{1}{2}\right) = 1 - P\left(X < \frac{1}{2}\right) = 1 - P\left(X \leq \frac{1}{2}\right)$$

where the last equality is true for continuous distributions.

$$P\left(X \geq \frac{1}{2}\right) = 1 - P\left(X \leq \frac{1}{2}\right) = 1 - F\left(\frac{1}{2}\right) = \frac{7}{8}$$

Question b) The density is the first derivative of the CDF for a continuous distribution (page 313), thus

$$f(x) = \frac{\mathsf{d}F(x)}{\mathsf{d}x} = 3x^2$$

Question c) We calculate the mean from the definition page

Question a) From the definition of the cumulative distribution function page 313 we get

$$P\left(X \geq \frac{1}{2}\right) = 1 - P\left(X < \frac{1}{2}\right) = 1 - P\left(X \leq \frac{1}{2}\right)$$

where the last equality is true for continuous distributions.

$$P\left(X \geq \frac{1}{2}\right) = 1 - P\left(X \leq \frac{1}{2}\right) = 1 - F\left(\frac{1}{2}\right) = \frac{7}{8}$$

Question b) The density is the first derivative of the CDF for a continuous distribution (page 313), thus

$$f(x) = \frac{\mathrm{d}F(x)}{\mathrm{d}x} = 3x^2$$

Question c) We calculate the mean from the definition page 261

Question a) From the definition of the cumulative distribution function page 313 we get

$$P\left(X \geq \frac{1}{2}\right) = 1 - P\left(X < \frac{1}{2}\right) = 1 - P\left(X \leq \frac{1}{2}\right)$$

where the last equality is true for continuous distributions.

$$P\left(X \geq \frac{1}{2}\right) = 1 - P\left(X \leq \frac{1}{2}\right) = 1 - F\left(\frac{1}{2}\right) = \frac{7}{8}$$

Question b) The density is the first derivative of the CDF for a continuous distribution (page 313), thus

$$f(x) = \frac{\mathrm{d}F(x)}{\mathrm{d}x} = 3x^2$$

Question c) We calculate the mean from the definition page 261

$$E(X)$$

Question a) From the definition of the cumulative distribution function page 313 we get

$$P\left(X \geq \frac{1}{2}\right) = 1 - P\left(X < \frac{1}{2}\right) = 1 - P\left(X \leq \frac{1}{2}\right)$$

where the last equality is true for continuous distributions.

$$P\left(X \geq \frac{1}{2}\right) = 1 - P\left(X \leq \frac{1}{2}\right) = 1 - F\left(\frac{1}{2}\right) = \frac{7}{8}$$

Question b) The density is the first derivative of the CDF for a continuous distribution (page 313), thus

$$f(x) = \frac{\mathsf{d}F(x)}{\mathsf{d}x} = 3x^2$$

Question c) We calculate the mean from the definition page 261

$$E(X) = \int_0^1$$

Question a) From the definition of the cumulative distribution function page 313 we get

$$P\left(X \geq \frac{1}{2}\right) = 1 - P\left(X < \frac{1}{2}\right) = 1 - P\left(X \leq \frac{1}{2}\right)$$

where the last equality is true for continuous distributions.

$$P\left(X \geq \frac{1}{2}\right) = 1 - P\left(X \leq \frac{1}{2}\right) = 1 - F\left(\frac{1}{2}\right) = \frac{7}{8}$$

Question b) The density is the first derivative of the CDF for a continuous distribution (page 313), thus

$$f(x) = \frac{\mathrm{d}F(x)}{\mathrm{d}x} = 3x^2$$

Question c) We calculate the mean from the definition page 261

$$E(X) = \int_0^1 x$$

IMM - DTU

02405 Probability
2003-10-16
BFN/bfn

Question a) From the definition of the cumulative distribution function page 313 we get

$$P\left(X \geq \frac{1}{2}\right) = 1 - P\left(X < \frac{1}{2}\right) = 1 - P\left(X \leq \frac{1}{2}\right)$$

where the last equality is true for continuous distributions.

$$P\left(X \geq \frac{1}{2}\right) = 1 - P\left(X \leq \frac{1}{2}\right) = 1 - F\left(\frac{1}{2}\right) = \frac{7}{8}$$

Question b) The density is the first derivative of the CDF for a continuous distribution (page 313), thus

$$f(x) = \frac{\mathrm{d}F(x)}{\mathrm{d}x} = 3x^2$$

Question c) We calculate the mean from the definition page 261

$$E(X) = \int_0^1 x f(x) \mathrm{d}x$$

Question a) From the definition of the cumulative distribution function page 313 we get

$$P\left(X \geq \frac{1}{2}\right) = 1 - P\left(X < \frac{1}{2}\right) = 1 - P\left(X \leq \frac{1}{2}\right)$$

where the last equality is true for continuous distributions.

$$P\left(X \geq \frac{1}{2}\right) = 1 - P\left(X \leq \frac{1}{2}\right) = 1 - F\left(\frac{1}{2}\right) = \frac{7}{8}$$

Question b) The density is the first derivative of the CDF for a continuous distribution (page 313), thus

$$f(x) = \frac{\mathrm{d}F(x)}{\mathrm{d}x} = 3x^2$$

Question c) We calculate the mean from the definition page 261

$$E(X) = \int_0^1 x f(x)\mathrm{d}x = \int_0^1 x$$

Question a) From the definition of the cumulative distribution function page 313 we get

$$P\left(X \geq \frac{1}{2}\right) = 1 - P\left(X < \frac{1}{2}\right) = 1 - P\left(X \leq \frac{1}{2}\right)$$

where the last equality is true for continuous distributions.

$$P\left(X \geq \frac{1}{2}\right) = 1 - P\left(X \leq \frac{1}{2}\right) = 1 - F\left(\frac{1}{2}\right) = \frac{7}{8}$$

Question b) The density is the first derivative of the CDF for a continuous distribution (page 313), thus

$$f(x) = \frac{\mathrm{d}F(x)}{\mathrm{d}x} = 3x^2$$

Question c) We calculate the mean from the definition page 261

$$E(X) = \int_0^1 x f(x)\mathrm{d}x = \int_0^1 x \cdot 3x^2 \mathrm{d}x$$

Question a) From the definition of the cumulative distribution function page 313 we get

$$P\left(X \geq \frac{1}{2}\right) = 1 - P\left(X < \frac{1}{2}\right) = 1 - P\left(X \leq \frac{1}{2}\right)$$

where the last equality is true for continuous distributions.

$$P\left(X \geq \frac{1}{2}\right) = 1 - P\left(X \leq \frac{1}{2}\right) = 1 - F\left(\frac{1}{2}\right) = \frac{7}{8}$$

Question b) The density is the first derivative of the CDF for a continuous distribution (page 313), thus

$$f(x) = \frac{\mathsf{d}F(x)}{\mathsf{d}x} = 3x^2$$

Question c) We calculate the mean from the definition page 261

$$E(X) = \int_0^1 x f(x) \mathsf{d}x = \int_0^1 x \cdot 3x^2 \mathsf{d}x = \frac{3}{4}$$

Question a) From the definition of the cumulative distribution function page 313 we get

$$P\left(X \geq \frac{1}{2}\right) = 1 - P\left(X < \frac{1}{2}\right) = 1 - P\left(X \leq \frac{1}{2}\right)$$

where the last equality is true for continuous distributions.

$$P\left(X \geq \frac{1}{2}\right) = 1 - P\left(X \leq \frac{1}{2}\right) = 1 - F\left(\frac{1}{2}\right) = \frac{7}{8}$$

Question b) The density is the first derivative of the CDF for a continuous distribution (page 313), thus

$$f(x) = \frac{\mathrm{d}F(x)}{\mathrm{d}x} = 3x^2$$

Question c) We calculate the mean from the definition page 261

$$E(X) = \int_0^1 x f(x)\mathrm{d}x = \int_0^1 x \cdot 3x^2 \mathrm{d}x = \frac{3}{4}$$

Question d) The variables Y_1, Y_2, and Y_3 are all

Question a) From the definition of the cumulative distribution function page 313 we get

$$P\left(X \geq \frac{1}{2}\right) = 1 - P\left(X < \frac{1}{2}\right) = 1 - P\left(X \leq \frac{1}{2}\right)$$

where the last equality is true for continuous distributions.

$$P\left(X \geq \frac{1}{2}\right) = 1 - P\left(X \leq \frac{1}{2}\right) = 1 - F\left(\frac{1}{2}\right) = \frac{7}{8}$$

Question b) The density is the first derivative of the CDF for a continuous distribution (page 313), thus

$$f(x) = \frac{\mathrm{d}F(x)}{\mathrm{d}x} = 3x^2$$

Question c) We calculate the mean from the definition page 261

$$E(X) = \int_0^1 x f(x)\mathrm{d}x = \int_0^1 x \cdot 3x^2 \mathrm{d}x = \frac{3}{4}$$

Question d) The variables Y_1, Y_2, and Y_3 are all uniformly distributed with CDF $F_Y(y)$

Question a) From the definition of the cumulative distribution function page 313 we get

$$P\left(X \geq \frac{1}{2}\right) = 1 - P\left(X < \frac{1}{2}\right) = 1 - P\left(X \leq \frac{1}{2}\right)$$

where the last equality is true for continuous distributions.

$$P\left(X \geq \frac{1}{2}\right) = 1 - P\left(X \leq \frac{1}{2}\right) = 1 - F\left(\frac{1}{2}\right) = \frac{7}{8}$$

Question b) The density is the first derivative of the CDF for a continuous distribution (page 313), thus

$$f(x) = \frac{\mathsf{d}F(x)}{\mathsf{d}x} = 3x^2$$

Question c) We calculate the mean from the definition page 261

$$E(X) = \int_0^1 x f(x) \mathsf{d}x = \int_0^1 x \cdot 3x^2 \mathsf{d}x = \frac{3}{4}$$

Question d) The variables Y_1, Y_2, and Y_3 are all uniformly distributed with CDF $F_Y(y) = y$ (see eg. page

Question a) From the definition of the cumulative distribution function page 313 we get

$$P\left(X \geq \frac{1}{2}\right) = 1 - P\left(X < \frac{1}{2}\right) = 1 - P\left(X \leq \frac{1}{2}\right)$$

where the last equality is true for continuous distributions.

$$P\left(X \geq \frac{1}{2}\right) = 1 - P\left(X \leq \frac{1}{2}\right) = 1 - F\left(\frac{1}{2}\right) = \frac{7}{8}$$

Question b) The density is the first derivative of the CDF for a continuous distribution (page 313), thus

$$f(x) = \frac{\mathsf{d}F(x)}{\mathsf{d}x} = 3x^2$$

Question c) We calculate the mean from the definition page 261

$$E(X) = \int_0^1 x f(x) \mathsf{d}x = \int_0^1 x \cdot 3x^2 \mathsf{d}x = \frac{3}{4}$$

Question d) The variables Y_1, Y_2, and Y_3 are all uniformly distributed with CDF $F_Y(y) = y$ (see eg. page 315).

Question a) From the definition of the cumulative distribution function page 313 we get

$$P\left(X \geq \frac{1}{2}\right) = 1 - P\left(X < \frac{1}{2}\right) = 1 - P\left(X \leq \frac{1}{2}\right)$$

where the last equality is true for continuous distributions.

$$P\left(X \geq \frac{1}{2}\right) = 1 - P\left(X \leq \frac{1}{2}\right) = 1 - F\left(\frac{1}{2}\right) = \frac{7}{8}$$

Question b) The density is the first derivative of the CDF for a continuous distribution (page 313), thus

$$f(x) = \frac{\mathrm{d}F(x)}{\mathrm{d}x} = 3x^2$$

Question c) We calculate the mean from the definition page 261

$$E(X) = \int_0^1 x f(x)\mathrm{d}x = \int_0^1 x \cdot 3x^2 \mathrm{d}x = \frac{3}{4}$$

Question d) The variables Y_1, Y_2, and Y_3 are all uniformly distributed with CDF $F_Y(y) = y$ (see eg. page 315). The discussion on the distribution of maximum of n indpendent random variables page

Question a) From the definition of the cumulative distribution function page 313 we get

$$P\left(X \geq \frac{1}{2}\right) = 1 - P\left(X < \frac{1}{2}\right) = 1 - P\left(X \leq \frac{1}{2}\right)$$

where the last equality is true for continuous distributions.

$$P\left(X \geq \frac{1}{2}\right) = 1 - P\left(X \leq \frac{1}{2}\right) = 1 - F\left(\frac{1}{2}\right) = \frac{7}{8}$$

Question b) The density is the first derivative of the CDF for a continuous distribution (page 313), thus

$$f(x) = \frac{\mathsf{d}F(x)}{\mathsf{d}x} = 3x^2$$

Question c) We calculate the mean from the definition page 261

$$E(X) = \int_0^1 x f(x)\mathsf{d}x = \int_0^1 x \cdot 3x^2 \mathsf{d}x = \frac{3}{4}$$

Question d) The variables Y_1, Y_2, and Y_3 are all uniformly distributed with CDF $F_Y(y) = y$ (see eg. page 315). The discussion on the distribution of maximum of n indpendent random variables page 316 tells us that Z

Question a) From the definition of the cumulative distribution function page 313 we get

$$P\left(X \geq \frac{1}{2}\right) = 1 - P\left(X < \frac{1}{2}\right) = 1 - P\left(X \leq \frac{1}{2}\right)$$

where the last equality is true for continuous distributions.

$$P\left(X \geq \frac{1}{2}\right) = 1 - P\left(X \leq \frac{1}{2}\right) = 1 - F\left(\frac{1}{2}\right) = \frac{7}{8}$$

Question b) The density is the first derivative of the CDF for a continuous distribution (page 313), thus

$$f(x) = \frac{\mathsf{d}F(x)}{\mathsf{d}x} = 3x^2$$

Question c) We calculate the mean from the definition page 261

$$E(X) = \int_0^1 x f(x) \mathsf{d}x = \int_0^1 x \cdot 3x^2 \mathsf{d}x = \frac{3}{4}$$

Question d) The variables Y_1, Y_2, and Y_3 are all uniformly distributed with CDF $F_Y(y) = y$ (see eg. page 315). The discussion on the distribution of maximum of n indpendent random variables page 316 tells us that $Z = \max(Y_1, Y_2, Y_3)$ with CDF

Question a) From the definition of the cumulative distribution function page 313 we get

$$P\left(X \geq \frac{1}{2}\right) = 1 - P\left(X < \frac{1}{2}\right) = 1 - P\left(X \leq \frac{1}{2}\right)$$

where the last equality is true for continuous distributions.

$$P\left(X \geq \frac{1}{2}\right) = 1 - P\left(X \leq \frac{1}{2}\right) = 1 - F\left(\frac{1}{2}\right) = \frac{7}{8}$$

Question b) The density is the first derivative of the CDF for a continuous distribution (page 313), thus

$$f(x) = \frac{\mathrm{d}F(x)}{\mathrm{d}x} = 3x^2$$

Question c) We calculate the mean from the definition page 261

$$E(X) = \int_0^1 x f(x) \mathrm{d}x = \int_0^1 x \cdot 3x^2 \mathrm{d}x = \frac{3}{4}$$

Question d) The variables Y_1, Y_2, and Y_3 are all uniformly distributed with CDF $F_Y(y) = y$ (see eg. page 315). The discussion on the distribution of maximum of n indpendent random variables page 316 tells us that $Z = \max(Y_1, Y_2, Y_3)$ with CDF $F_Z(z)$

$$F_Z(z)$$

Question a) From the definition of the cumulative distribution function page 313 we get

$$P\left(X \geq \frac{1}{2}\right) = 1 - P\left(X < \frac{1}{2}\right) = 1 - P\left(X \leq \frac{1}{2}\right)$$

where the last equality is true for continuous distributions.

$$P\left(X \geq \frac{1}{2}\right) = 1 - P\left(X \leq \frac{1}{2}\right) = 1 - F\left(\frac{1}{2}\right) = \frac{7}{8}$$

Question b) The density is the first derivative of the CDF for a continuous distribution (page 313), thus

$$f(x) = \frac{\mathrm{d}F(x)}{\mathrm{d}x} = 3x^2$$

Question c) We calculate the mean from the definition page 261

$$E(X) = \int_0^1 x f(x) \mathrm{d}x = \int_0^1 x \cdot 3x^2 \mathrm{d}x = \frac{3}{4}$$

Question d) The variables Y_1, Y_2, and Y_3 are all uniformly distributed with CDF $F_Y(y) = y$ (see eg. page 315). The discussion on the distribution of maximum of n indpendent random variables page 316 tells us that $Z = \max(Y_1, Y_2, Y_3)$ with CDF $F_Z(z)$

$$F_Z(z) = P(Z \leq z)$$

Question a) From the definition of the cumulative distribution function page 313 we get

$$P\left(X \geq \frac{1}{2}\right) = 1 - P\left(X < \frac{1}{2}\right) = 1 - P\left(X \leq \frac{1}{2}\right)$$

where the last equality is true for continuous distributions.

$$P\left(X \geq \frac{1}{2}\right) = 1 - P\left(X \leq \frac{1}{2}\right) = 1 - F\left(\frac{1}{2}\right) = \frac{7}{8}$$

Question b) The density is the first derivative of the CDF for a continuous distribution (page 313), thus

$$f(x) = \frac{\mathrm{d}F(x)}{\mathrm{d}x} = 3x^2$$

Question c) We calculate the mean from the definition page 261

$$E(X) = \int_0^1 x f(x)\mathrm{d}x = \int_0^1 x \cdot 3x^2 \mathrm{d}x = \frac{3}{4}$$

Question d) The variables Y_1, Y_2, and Y_3 are all uniformly distributed with CDF $F_Y(y) = y$ (see eg. page 315). The discussion on the distribution of maximum of n indpendent random variables page 316 tells us that $Z = \max(Y_1, Y_2, Y_3)$ with CDF $F_Z(z)$

$$F_Z(z) = P(Z \leq z) = P(\max(Y_1, Y_2, Y_3) \leq z)$$

Question a) From the definition of the cumulative distribution function page 313 we get

$$P\left(X \geq \frac{1}{2}\right) = 1 - P\left(X < \frac{1}{2}\right) = 1 - P\left(X \leq \frac{1}{2}\right)$$

where the last equality is true for continuous distributions.

$$P\left(X \geq \frac{1}{2}\right) = 1 - P\left(X \leq \frac{1}{2}\right) = 1 - F\left(\frac{1}{2}\right) = \frac{7}{8}$$

Question b) The density is the first derivative of the CDF for a continuous distribution (page 313), thus

$$f(x) = \frac{\mathrm{d}F(x)}{\mathrm{d}x} = 3x^2$$

Question c) We calculate the mean from the definition page 261

$$E(X) = \int_0^1 x f(x)\mathrm{d}x = \int_0^1 x \cdot 3x^2 \mathrm{d}x = \frac{3}{4}$$

Question d) The variables Y_1, Y_2, and Y_3 are all uniformly distributed with CDF $F_Y(y) = y$ (see eg. page 315). The discussion on the distribution of maximum of n indpendent random variables page 316 tells us that $Z = \max(Y_1, Y_2, Y_3)$ with CDF $F_Z(z)$

$$F_Z(z) = P(Z \leq z) = P(\max(Y_1, Y_2, Y_3) \leq z) = P(Y_1 \leq z, Y_2 \leq z, Y_3 \leq z)$$

Question a) From the definition of the cumulative distribution function page 313 we get

$$P\left(X \geq \frac{1}{2}\right) = 1 - P\left(X < \frac{1}{2}\right) = 1 - P\left(X \leq \frac{1}{2}\right)$$

where the last equality is true for continuous distributions.

$$P\left(X \geq \frac{1}{2}\right) = 1 - P\left(X \leq \frac{1}{2}\right) = 1 - F\left(\frac{1}{2}\right) = \frac{7}{8}$$

Question b) The density is the first derivative of the CDF for a continuous distribution (page 313), thus

$$f(x) = \frac{\mathrm{d}F(x)}{\mathrm{d}x} = 3x^2$$

Question c) We calculate the mean from the definition page 261

$$E(X) = \int_0^1 x f(x) \mathrm{d}x = \int_0^1 x \cdot 3x^2 \mathrm{d}x = \frac{3}{4}$$

Question d) The variables Y_1, Y_2, and Y_3 are all uniformly distributed with CDF $F_Y(y) = y$ (see eg. page 315). The discussion on the distribution of maximum of n indpendent random variables page 316 tells us that $Z = \max(Y_1, Y_2, Y_3)$ with CDF $F_Z(z)$

$$F_Z(z) = P(Z \leq z) = P(\max(Y_1, Y_2, Y_3) \leq z) = P(Y_1 \leq z, Y_2 \leq z, Y_3 \leq z)$$

$$= P(Y_1 \leq z) P(Y_2 \leq z) P(Y_3 \leq z)$$

Question a) From the definition of the cumulative distribution function page 313 we get

$$P\left(X \geq \frac{1}{2}\right) = 1 - P\left(X < \frac{1}{2}\right) = 1 - P\left(X \leq \frac{1}{2}\right)$$

where the last equality is true for continuous distributions.

$$P\left(X \geq \frac{1}{2}\right) = 1 - P\left(X \leq \frac{1}{2}\right) = 1 - F\left(\frac{1}{2}\right) = \frac{7}{8}$$

Question b) The density is the first derivative of the CDF for a continuous distribution (page 313), thus

$$f(x) = \frac{\mathsf{d}F(x)}{\mathsf{d}x} = 3x^2$$

Question c) We calculate the mean from the definition page 261

$$E(X) = \int_0^1 x f(x)\mathsf{d}x = \int_0^1 x \cdot 3x^2 \mathsf{d}x = \frac{3}{4}$$

Question d) The variables Y_1, Y_2, and Y_3 are all uniformly distributed with CDF $F_Y(y) = y$ (see eg. page 315). The discussion on the distribution of maximum of n indpendent random variables page 316 tells us that $Z = \max(Y_1, Y_2, Y_3)$ with CDF $F_Z(z)$

$$F_Z(z) = P(Z \leq z) = P(\max(Y_1, Y_2, Y_3) \leq z) = P(Y_1 \leq z, Y_2 \leq z, Y_3 \leq z)$$

$$= P(Y_1 \leq z)P(Y_2 \leq z)P(Y_3 \leq z) = z^3$$