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02405 Probability
2004-4-12
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Question a) Consider the joint distribution on the unit square.

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Question a) Consider the joint distribution on the unit square. The area of the triangle $x + y > 1, x < 1, y < 1$ is $\frac{1}{8}$,

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Question a) Consider the joint distribution on the unit square. The area of the triangle $x+y>1, x<1, y<1$ is $\frac{1}{8}$, thus $F_{S_2}(1.5)$

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Question a) Consider the joint distribution on the unit square. The area of the triangle $x+y>1, x<1, y<1$ is $\frac{1}{8}$, thus $F_{S_2}(1.5)=1-\frac{1}{8}=\frac{7}{8}$. Alternatively one could use the boxed result page 372

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$$F_{S_2}(x) = \begin{cases} \frac{x^2}{2} & 0 \leq z \leq 1 \\ 2z - \frac{z^2}{2} - 1 & 1 \leq z \leq 2 \end{cases}$$

and $F_{S_2}(1.5) = 0.875$.

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Question b) This is a) in example 3 page 379. $P(S_3 \leq 1.5) = 0.5$.

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Question b) This is a) in example 3 page 379. $P(S_3\leq 1.5)=0.5$.

Question c) Now using the results of example 3 we get

$$P(S_3\leq 1.1)$$

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and $F_{S_2}(1.5) = 0.875$.

Question b) This is a) in example 3 page 379. $P(S_3 \leq 1.5) = 0.5$.

Question c) Now using the results of example 3 we get

$$P(S_3 \leq 1.1) = \int_0^1 \frac{t^2}{2}\mathsf{d}t + \int_1^{1.1} \left(-t^2 + 3t - \frac{3}{2}\right)\mathsf{d}t$$

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and $F_{S_2}(1.5)=0.875.$

Question b) This is a) in example 3 page 379. $P(S_3\le 1.5)=0.5.$

Question c) Now using the results of example 3 we get

$$P(S_3\le 1.1)=\int_0^1 \frac{t^2}{2}\mathrm{d}t+\int_1^{1.1}\left(-t^2+3t-\frac{3}{2}\right)\mathrm{d}t=\frac{1}{6}+\left[-\frac{t^3}{3}+\frac{3t^2}{2}-\frac{3t}{2}\right]_{t=1}^{t=1.1}$$

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Question a) Consider the joint distribution on the unit square. The area of the triangle $x+y>1, x<1, y<1$ is $\frac{1}{8}$, thus $F_{S_2}(1.5)=1-\frac{1}{8}=\frac{7}{8}$. Alternatively one could use the boxed result page 372 with $S_2=X_1+X_2$, X_i uniforum. We find

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and $F_{S_2}(1.5)=0.875$.

Question b) This is a) in example 3 page 379. $P(S_3\leq 1.5)=0.5$.

Question c) Now using the results of example 3 we get

$$P(S_3\leq 1.1)=\int_0^1\frac{t^2}{2}\mathrm{d}t+\int_1^{1.1}\left(-t^2+3t-\frac{3}{2}\right)\mathrm{d}t=\frac{1}{6}+\left[-\frac{t^3}{3}+\frac{3t^2}{2}-\frac{3t}{2}\right]_{t=1}^{t=1.1}=0.2213$$

Question d) Using the standard approximation

Question a) Consider the joint distribution on the unit square. The area of the triangle $x+y>1, x<1, y<1$ is $\frac{1}{8}$, thus $F_{S_2}(1.5)=1-\frac{1}{8}=\frac{7}{8}$. Alternatively one could use the boxed result page 372 with $S_2=X_1+X_2$, X_i uniforum. We find

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Question d) Using the standard approximation $P(x<S_3<x+\mathrm{d}x)$

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Question b) This is a) in example 3 page 379. $P(S_3 \leq 1.5) = 0.5.$

Question c) Now using the results of example 3 we get

$$P(S_3 \leq 1.1) = \int_0^1 \frac{t^2}{2}\mathrm{d}t + \int_1^{1.1} \left(-t^2 + 3t - \frac{3}{2}\right)\mathrm{d}t = \frac{1}{6} + \left[-\frac{t^3}{3} + \frac{3t^2}{2} - \frac{3t}{2}\right]_{t=1}^{t=1.1} = 0.2213$$

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and $F_{S_2}(1.5)=0.875$.

Question b) This is a) in example 3 page 379. $P(S_3\le 1.5)=0.5$.

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$$P(S_3\le 1.1)=\int_0^1\frac{t^2}{2}\mathsf{d}t+\int_1^{1.1}\left(-t^2+3t-\frac{3}{2}\right)\mathsf{d}t=\frac{1}{6}+\left[-\frac{t^3}{3}+\frac{3t^2}{2}-\frac{3t}{2}\right]_{t=1}^{t=1.1}=0.2213$$

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Question d) Using the standard approximation $P(x<S_3<x+\mathrm{d}x)\tilde{=}f_{S_3}(x)\mathrm{d}x$ we find $P(1\le S_3\le 1.001)\tilde{=}\frac{1}{2}\cdot 0.001$

Question a) Consider the joint distribution on the unit square. The area of the triangle $x+y>1, x<1, y<1$ is $\frac{1}{8}$, thus $F_{S_2}(1.5) = 1 - \frac{1}{8} = \frac{7}{8}$. Alternatively one could use the boxed result page 372 with $S_2 = X_1 + X_2$, X_i uniforum. We find

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Question b) This is a) in example 3 page 379. $P(S_3 \le 1.5) = 0.5$.

Question c) Now using the results of example 3 we get

$$P(S_3 \le 1.1) = \int_0^1 \frac{t^2}{2}\mathsf{d}t + \int_1^{1.1} \left(-t^2 + 3t - \frac{3}{2}\right)\mathsf{d}t = \frac{1}{6} + \left[-\frac{t^3}{3} + \frac{3t^2}{2} - \frac{3t}{2}\right]_{t=1}^{t=1.1} = 0.2213$$

Question d) Using the standard approximation $P(x < S_3 < x + \mathsf{d}x) \tilde{=} f_{S_3}(x)\mathsf{d}x$ we find $P(1 \le S_3 \le 1.001) \tilde{=} \frac{1}{2} \cdot 0.001 = 0.0005$.