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## Exercise: From joint PDFs to probabilities

(8/8 points)

a) The probability of the event that $0 \le Y \le X \le 1$ is of the form $\int_a^b \left( \int_c^d f_{X,Y}(x,y)\,dx \right) dy.$

Find the values of $a$, $b$, $c$, $d$. Each one of your answers should be one of the following: $0$, $x$, $y$, or $1$.

$a =$ 0 ✔ **Answer:** 0

$b =$ 1 ✔ **Answer:** 1

$c =$ y ✔ **Answer:** y

$d =$ 1 ✔ **Answer:** 1

b) The probability of the event that $0 \le Y \le X \le 1$ is also of the form $\int_a^b \left( \int_c^d f_{X,Y}(x,y)\,dy \right) dx.$ Note the different order of integration as compared to part (a).

Find the values of $a$, $b$, $c$, $d$. Each one of your answers should be one of the following: $0$, $x$, $y$, or $1$.

$a =$ 0 ✔ **Answer:** 0

$b =$ 1 ✔ **Answer:** 1

$c =$ 0 ✔ **Answer:** 0

$d =$ x ✔ **Answer:** x

Answer:

a) For any given $y \in [0,1]$, $x$ ranges from $y$ to $1$, yielding $\int_0^1 \int_y^1 f_{X,Y}(x,y)\,dx\,dy.$

b) For any given $x \in [0,1]$, $y$ ranges from $0$ to $x$, yielding $\int_0^1 \int_0^x f_{X,Y}(x,y)\, dy\, dx$.

*You have used 2 of 2 submissions*