STOR 435 Homework 18

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1.

a) $\int_0^1 \int_0^y c(x^2+y^2)dxdy = 1 \rightarrow \frac{c}{3} = 1 \rightarrow c = 3$

b) $f_X(x) = \begin{cases} \int_x^1 3(x^2+y^2)dy = -4x^3+3x^2+1 & \text{if } x \in [0,1] \\ 0 & \text{otherwise} \end{cases}$

c) $f_Y(y) = \begin{cases} \int_0^y 3(x^2+y^2)dx = 4y^3 & \text{if } y \in [0,1] \\ 0 & \text{otherwise} \end{cases}$

d) $\mathbb{E}(X) = \int_0^1 \int_0^y x \times 3(x^2+y^2)dxdy = \frac{9}{20}$

2.

a)

x/y	0	1	2	3
0	0.1	0	0	0
1	0.08	0.32	0	0
2	0.016	0.128	0.256	0
3	0.0008	0.0096	0.0384	0.0512

b)

x	$p_X(x)$
0	0.1
1	0.4
2	0.4
3	0.1

c)

y	$p_Y(y)$
0	0.1968
1	0.4576
2	0.2944
3	0.0512

d) $\mathbb{E}(Y) = \sum_{y=0}^{y=3} p_Y(y)y = 1.2$

3.

a) $\frac{23}{32}$

b) $\frac{23}{32}$

c) $\frac{1}{8}(\ln(4)+5)$

d) $\frac{5}{8}$