یا لطیف

رضا ادیب‌پور
٩٨١۴٣٠٣
امتحان آمار و احتمال مهندسی
پایان‌ترم

#1 الف) $\iint f(x,y)\,dx\,dy = 1 \Rightarrow c\int_0^1\int_0^y (x-y)^a\,dx\,dy = 1$

$$\Rightarrow c\int_0^1 \frac{(x-y)^{a+1}}{a+1}\Big|_0^y\,dy = \frac{c}{(a+1)} \times \frac{(-y)^{a+2}}{a+2}\Big|_0^1 = 1$$

$$\Rightarrow \frac{c}{(a+1)(a+2)}(-1)^{a+2} = 1 \Rightarrow c = \frac{(a+1)(a+2)}{(-1)^{a+2}}$$

ب) $f_{X|Y}(x|y) = \dfrac{f(x,y)}{f_Y(y)} \Rightarrow f_Y(y) = \int f(x,y)\,dx$

$$\Rightarrow f_Y(y) = \int_0^y (-1)^{a+2}(a+1)(a+2)(x-y)^a\,dx = \frac{(-1)^{a+2}(a+1)(a+2)(x-y)^{a+1}}{a+1}\Big|_0^y$$

$$= (-1)^{a+2}\cdot(a+2)\cdot(-1)\cdot(-y)^{a+1} = (-1)^{a+3}\cdot(a+2)\cdot(-y)^{a+1}$$

$$\Rightarrow f_{X|Y}(x|y) = \frac{(-1)^{a+2}\cdot(a+1)\cdot(a+2)\cdot(x-y)^a}{(-1)^{a+3}\cdot(a+2)\cdot(-y)^{a+1}} \quad ; \quad 0<x<1$$

$$\Rightarrow f_{X|Y}(x|y) = \begin{cases} -(a+1)\cdot\dfrac{(x-y)^a}{(-y)^{a+1}} & ; \quad 0<x<1 \\ 0 & ; \quad \text{other} \end{cases}$$

ج)  واریانس : $x|y = 0.5 \Rightarrow f(a,b) = \frac{d^2}{dadb} f(a,b)$ , $f(x) = \int_{-\infty}^{\infty} 0.5$

$$\Rightarrow ab \int_{b}^{b+ab}$$

#4

$$\begin{cases} P(A) = 32 \\ P(A \cap B) = 50 \end{cases}$$

انتخاب اینکه دولرون به طور
تصادفی انتخاب شود

$$\Rightarrow P(B \mid A) = \frac{P(A \cap B)}{P(A)} = \frac{50}{32}$$

$$P(A \cap B) = P(B - A) = P(B) - P(A \cap B) = P(B) - P(A)\,P(B)$$

$$= P(B) \in P(A) = P(B) \cdot P(A)$$

الف) $P(A \cap B) = P(A') \times P(B') = \frac{50}{32} \times \frac{32}{50} = 1$

ب) $P(A \cup B) = P(A) \times P(B) - P(A \cap B) = \frac{50}{32} \times \frac{32}{50} - 540 \simeq$

# 5

$1-\alpha = 0.99 \Rightarrow \alpha = 0.01 \Rightarrow \frac{\alpha}{2} = 0.005 \longrightarrow 1$

$62.52 - 3.250\left(\frac{0.11}{\sqrt{15}}\right), \quad 6.52 + 3.25\left(\frac{0.11}{\sqrt{15}}\right)$

$(6.41, 6.63)$ : درنتیجه

$\left(\bar{x} - t\left(n-1, 1-\frac{\alpha}{2}\right)\frac{S}{\sqrt{n}}, \quad \bar{x} + t\left(n-1, 1-\frac{\alpha}{2}\right)\frac{S}{\sqrt{n}}\right)$

$\left(6.52 - 2.262\left(\frac{0.11}{\sqrt{10}}\right), \quad 6.52 + 2.262\left(\frac{0.11}{\sqrt{10}}\right)\right)$

$\Rightarrow (6.44, 6.59)$