交通大學 應數系 統計學 練習一

日期:2014.10.09 時間:5:30 教室:SA214

一. 回答時盡可能詳細、清楚，若有使用到的定理，可直接引述該定理名稱。

二. 主題以外的內容當作已知，不必多做繁瑣的證明。

1. Suppose X has p.d.f. with $f(x)=\begin{cases}\frac{3x^2}{a^3}, & 0<x<a\\ 0, & o.w\end{cases}$

   (1) If P(X＞1)=7/8，find the value of a.
   (2) Find E(X).

2. Let the p.d.f of X be $f(x)=\begin{cases}\frac{1}{5}, x=1\\ \frac{2}{5}, x=2,4.\\ 0, o.w.\end{cases}$

   Find m.g.f. of X, E(X), Var(X).

3. Suppose X has density $f(x)=\frac{1}{4}$, $-1\le x\le 3$, and let $U=X^2$.

   (1) Find the distribution funtion F(u)=P(U$\le u$) of U.
   (2) Find the density funtion of U.

4. Let Z be a standard normal random variable. Use the method of moment-generating function to find the probability distribution of Z^2.

5. 現有一種 AIDS 反應測試劑,對患者測試有 99%呈陽性反應,而對非患者測試 98%呈陰性反應。若知某地 AIDS 患者占 4%,今在該地隨機抽驗一人,經測試呈陽性反應,問此人未患有愛滋病的機率為何?

6. There are three sealed and opaque boxes, each containing a ball. These three balls are identical except that two balls are red and one ball is green. If you pick the box that contains a green ball, you will receive $10,000 in reward. Suppose you picked one of the boxes at random, and then one of the other boxes was opened which contains a red ball. You are now offered an option to exchange the boxes. Should you change your pick?