SOUTHERN UNIVERSITY OF SCIENCE AND TECHNOLOGY
DEPARTMENT OF MATHEMATICS

MA215 Probability Theory

Homework 6

1. Find the following values by using the Statistical Tables:

   ~~(a) $F(4)$ and $p(6)$ where $F(x)$ and $p(x)$ are the c.d.f. and p.m.f., respectively, of the Binomial random variable with parameters 13 and 0.25.~~

   划掉的不需要做

   ~~(b) $F(18.4)$ and $p(21)$ where $F(x)$ and $p(x)$ are the c.d.f. and p.m.f., respectively, of the Poisson random variable with parameter 15.9.~~

   (c) $F(-1.72)$, $F(-1.723)$, $F(0.48)$ and $F(1.234)$ where $F(x)$ is the c.d.f. of the standard normal random variable.

   (d) Find x such that $F(x) = 0.546$ where $F(x)$ is the c.d.f. of the standard normal random variable. Similarly find y such that $F(y) = 0.258$.

2. Assume that heights of children in a certain age group average are normally distributed, i.e. $X \sim N(\mu, \sigma^2)$, where $\mu = 58.4$ inches and with $\sigma = 2.9$ inches.

   (a) What proportion of children are between 57 and 61 inches tall?

   (b) What is the number c such that 90% of the children's height in a certain age group average is less than c?

3. Suppose $X \sim N(\mu, \sigma^2)$ and let $Y = \exp(X) = \mathrm{e}^X$.

   (a) What are all possible values of Y?

   (b) Obtain the probability density function of Y.

4. Suppose $X \sim N(\mu, \sigma^2)$ and let $Y = aX + b$ where a and b are two constants and the constant a is not zero.

   (a) What are all possible values of Y?

   (b) Obtain the probability density function of Y.

   (c) Explain Y is also normally distributed. What are the parameters of Y?

补充题1 设随机变量 X 的频率函数为

X	-2	-1	0	1	2
P	1/5	1/6	1/5	1/15	11/30

求 $Y=X^2$ 的频率函数.

补充题2 设随机变量 X 的概率密度为

$$f(x)=\begin{cases}\dfrac{2x}{\pi^2} & 0<x<\pi \\ 0 & \text{其它}\end{cases}$$

求 $Y=\sin X$ 的概率密度.

补充题 3.设 $P\{X=k\}=\left(\frac{1}{2}\right)^k, k=1,2,\ldots,$ 令

$$Y=\begin{cases}1, & \text{当}X\text{取偶数时} \\ -1, & \text{当}X\text{取奇数时.}\end{cases}$$

求随机变量 X 的函数 Y 的分布律.

补充题 4 .设随机变量 X 在区间 $(1,2)$ 上服从均匀分布，试求随机变量 $Y=e^{2x}$,的概率密度 $f_Y(y)$.