國立高雄第一科技大學 100 學年度 碩士班 招生考試 試題紙

系 所 別：電腦與通訊工程系　　組　別：通訊組

考科代碼：1211　　考　科：機率

注意事項：

1、本科目得使用本校提供之電子計算器。

2、請於答案卷上規定之範圍作答，違者該題不予計分。

1. Random variable X is uniformly distributed in the interval [-1, +1]. Let random variable $Y=X^2$, find the probability $P[Y \leqq 0.25]$=? (10 points)

2. Let random variable Y=aX+b, where a is a nonzero constant and the probability density function $f_X(x)= \frac{1}{\sqrt{2\pi}} e^{-\frac{x^2}{2}}$. Find the probability density function $f_Y(y)$ of the random variable Y. (10 points)

3. Let random variable Y=cos(X), where X is uniformly distributed in the interval $(0, 2\pi)$. Find the probability density function $f_Y(y)$ of the random variable Y. (20 points)

4. T_1 and T_2 are independent identically distributed exponential random variables. Let $T=T_1+T_2$, find the probability density function $f_T(x)$ of the random variable T. (20 points)

$$f_{T_1}(x)=\begin{cases}\lambda e^{-\lambda x} & x \geq 0 \\ 0 & x<0\end{cases}$$

5. Let X and Y be independent random variables that are uniformly distributed in [0,1]. Find the probability for the event P[XY<0.5]. (20 points)

6. $X_1,X_2,\ldots,X_n$ are independent, identically distributed random variables with mean μ and variance σ^2. Let random variable $S_n=X_1+X_2+\ldots\ldots+X_n$, find $E[S_n]$=? and $Var[S_n]$=? (20 points)