109 學年度 第二 學期 中 考 資工 系 姓名 許志綱 學號 B0729011

[1] (1) $f_X(0)=\frac{C_0^{10}C_{10}^{90}}{C_{10}^{100}}\doteq 0.0038$ $f_X(1)=\frac{C_1^{10}C_9^{90}}{C_{10}^{100}}\doteq 0.0408$ $f_X(2)=\frac{C_2^{10}C_8^{90}}{C_{10}^{100}}\doteq 0.2015$ $f_X(3)=\frac{C_3^{10}C_7^{90}}{C_{10}^{100}}\doteq 0.0518$ $f_X(4)=\frac{C_4^{10}C_6^{90}}{C_{10}^{100}}\doteq 0.0076$ $f_X(5)=\frac{C_5^{10}C_5^{90}}{C_{10}^{100}}\doteq 0.0006$ $f_X(6)=\frac{C_6^{10}C_4^{90}}{C_{10}^{100}}\doteq 0.00003$ $f_X(7)=\frac{C_7^{10}C_3^{90}}{C_{10}^{100}}\doteq 0.0000001$ $f_X(8)=\frac{C_8^{10}C_2^{90}}{C_{10}^{100}}\doteq 0.0000$ $f_X(9)=\frac{C_9^{10}C_1^{90}}{C_{10}^{100}}\doteq 0.0000$ $f_X(10)=\frac{C_{10}^{10}C_0^{90}}{C_{10}^{100}}\doteq 0.0000$

$C_r^n=\binom{n}{r}=\frac{n!}{r!(n-r)!}$

(2) $E[X]=0\times 0.0038+1\times 0.0408+2\times 0.2015+3\times 0.0518+4\times 0.0076+5\times 0.0006+6\times 0.00003+\cdots=0.0408+0.4030+0.1554+0.0304+0.0030+0.00018=0.63278$ #

(3) $Std[X]=\sqrt{1.45068-(0.63278)^2}=1.0248$ #

$E[X^2]=0\times 0.0038+1^2\times 0.0408+2^2\times 0.2015+3^2\times 0.0518+4^2\times 0.0076+5^2\times 0.0006+6^2\times 0.00003+\cdots=0.0408+0.8060+0.4662+0.1216+0.015+0.00108=1.45068$

(4) $f_Y(0)=\frac{C_1^{10}\cdots C_1^{81}}{C_1^{100}\cdots C_1^{91}}\doteq 0.3305$ $f_Y(1)=\frac{C_1^{10}\times C_1^{90}\cdots C_1^{82}}{C_1^{100}\cdots C_1^{91}}\doteq 0.0408$ $f_Y(2)=\frac{C_1^{10}C_1^{9}\times C_1^{90}\cdots C_1^{83}}{C_1^{100}\cdots C_1^{91}}\doteq 0.0045$ $f_Y(3)=\frac{C_1^{10}\cdots C_1^{8}\times C_1^{91}\cdots C_1^{84}}{C_1^{100}\cdots C_1^{91}}\doteq 0.0004$ $f_Y(4)=\frac{C_1^{10}\cdots C_1^{9}\times C_1^{90}\cdots C_1^{85}}{C_1^{100}\cdots C_1^{91}}\doteq 0.00004$ $f_Y(5)=\frac{C_1^{10}\cdots C_1^{9}\times C_1^{91}\cdots C_1^{94}}{C_1^{100}\cdots C_1^{91}}\doteq 0.0000$ $f_Y(6)$, $f_Y(7)$, $f_Y(8)$, $f_Y(9)$, $f_Y(10)\doteq 0.0000$

(5) $Std[Y]+E[Y]=0.0604+0.05116=0.11156$ #

$E[Y]=0\times 0.3305+1\times 0.0408+2\times 0.0045+3\times 0.0004+4\times 0.00004+\cdots=0.05116$ $E[Y^2]=1^2\times 0.0408+2^2\times 0.0045+3^2\times 0.0004+4^2\times 0.00004+\cdots=0.06304$

$Std[Y]=\sqrt{0.06304-(0.05116)^2}=0.0604$

(6)

[2] (1) $f_W(w) = \frac{e^{-100}(100)^w}{w!}$

(2) $E[W] + Std(W) = (1 \cdot 100) + (1 \cdot 100) = 200$

(3)

(4)