P142.1.

X	1	2	3	4
P				

$P(X=1)=$ $\cancel{\frac{3}{4}}$ $\cancel{\frac{3}{4}}$ $C_3^1\times\frac{1}{4}\times(\frac{3}{4})^2+C_3^2\times(\frac{1}{4})^2\times\frac{3}{4}+C_3^3\times(\frac{1}{4})^3=\frac{37}{64}$.

同理 $P(X=2)=\frac{19}{64}$, $P(X=3)=\frac{7}{64}$, $P(X=4)=\frac{1}{64}$

$\therefore E(X)=\frac{25}{16}$.

P142.3.

X为. $X=3、4、5$.

$P(X=3)=2\times\frac{1}{2}\times\frac{1}{2}\times\frac{1}{2}=\frac{1}{4}$

$P(X=4)=2\times\frac{1}{2}\times\frac{1}{2}\times\frac{1}{2}\times C_3^2\times\frac{1}{2}=\frac{3}{8}$

$P(X=5)=2\times\frac{1}{2}\times\frac{1}{2}\times\frac{1}{2}\times\frac{1}{2}\times C_4^2\times\frac{1}{2}=\frac{3}{8}$.

$\therefore E(X)=33/8$

P142.5.

第X层. 停了1, 不停0

X_i	0	1
P	$\left(\frac{n-2}{n-1}\right)^m$	$1-\left(\frac{n-2}{n-1}\right)^m$.

$E(X_i) = 1-\left(\frac{n-2}{n-1}\right)^m \quad \therefore E(X) = \sum_{i=2}^{n} E(X_i) = (n-1)\left(1-\left(\frac{n-2}{n-1}\right)^m\right).$

P142.6

设缴纳X，收益Y．n个人，z个死亡，$n\geq z$．

$\therefore Y = n\cdot X - m\cdot z$ ． $\therefore E(Y) = \cancel{nE(X)}\ nX - mE(z)$．

$E(z) = np = np$ $\therefore E(Y) = n(X - mp) \geq 5\% \cdot nm$．

$\Rightarrow X \geq \cancel{\frac{21}{20}mp}\ m(p+0.05)$．

P143、11

$E(X) = \int_{-\infty}^{+\infty} x f(x)dx = \int_0^1 x^2 dx + \int_1^2 x(2-x)dx = 1$

$E(2X+1) = 2E(X)+1 = 3$

$E(e^{-x}) = \int_{-\infty}^{+\infty} e^{-x} f(x)dx = \int_0^1 e^{-x} x dx + \int_1^2 e^{-x}(2-x)dx$

$= 1 + e^{-2} - 2e^{-1}$

P143、13

$X \sim N(M,1)$

$E(T) = \int_{-\infty}^{+\infty} T(x)\cdot f(x)dx = \int_{-\infty}^{10} -f(x)dx + \int_{10}^{12} 20 f(x)dx + \int_{12}^{+\infty} -5 f(x)dx$

$= -\Phi(10-M) + 20[\Phi(12-M) - \Phi(10-M)] - 5(1 - \Phi(12-M))$

$= 25\Phi(12-M) - 21\Phi(10-M) - 5$．

令$F(M) = E(T)$ $\therefore F'(M) = 25\frac{1}{\sqrt{2\pi}}e^{-\frac{(12-M)^2}{2}} - 21\frac{1}{\sqrt{2\pi}}e^{-\frac{(10-M)^2}{2}}$

$\therefore F'(M) = 0$ 时 $M = 11 - \frac{1}{2}\ln\frac{21}{25}$ $\therefore$ 此时 $E(T)_{max}$.

$\approx 10.91mm$.