1. $E(x) = 5 \times \dfrac{3}{12+3} = 1$

3. $E(X) = \displaystyle\int_{-\infty}^{+\infty} x f(x)\, dx$

$= \displaystyle\int_{0}^{+\infty} x \lambda e^{-\lambda x}\, dx$

$= \dfrac{1}{\lambda}$

5. $E(x) = \displaystyle\int_{-\infty}^{+\infty} x f(x)\, dx$

$= \displaystyle\int_{0}^{+\infty} x \dfrac{x}{6^2} e^{-\frac{x^2}{2 6^2}}\, dx$

$= \sqrt{\dfrac{\pi}{2}}\, 6$

6. $f(x) = \begin{cases} \dfrac{3a^3}{x^4}, & x \geqslant a \\[2mm] 0 & x < a \end{cases}$

$E(x) = \displaystyle\int_{-\infty}^{+\infty} x f(x)\, dx = \int_{a}^{+\infty} x \dfrac{3a^3}{x^4}\, dx = \dfrac{3}{2} a$

10. $E\left(\tfrac{1}{2} m X^2\right) = \displaystyle\int_{-\infty}^{+\infty} \tfrac{1}{2} m x^2 \cdot f(x)\, dx = \int_{-\infty}^{+\infty} \tfrac{1}{2} m x^2 \dfrac{4 x^2}{a^3 \cdot \sqrt{\pi}} e^{\frac{-x^2}{a^2}}\, dx$

$= \dfrac{3}{4} m a^2$

(2. (1)) $a+0.1+0+0.1+0+b+0.1+0.1+c=1$

$P(X=-1) = a+0.1$ $P(Y=1)=a+0.2$

$P(X=0) = 0.1+b$ $P(Y=2)=0.2$

$P(X=1) = 0.2+C$ $P(Y=3)=b+c$

$(-1) \times (a+0.1) +0\times(0.1+b) + 1\times(0.2+C) =0$

$(a+0.2)\times1+ 0.2\times2+ 3\times(b+c) =0$

$\Rightarrow a= 0.2, \quad b= 0.3, \quad c= 0.1$

(2)

$(X-Y)^2$	0	1	4	9	16
P	0.1	0.2	0.3	0.4	0

$$E(Z)= 0.2+1.2+3.6=5$$

(3)

X^2Y	0	1	2	3
P	0.4	0.3	0.2	0.1

$$E(Z)= 0.3 + 0.3+ 0.4= 1$$

17.

(1) $f_X(x) = \begin{cases} \dfrac{1}{2} & (0<x<2) \\ 0 & (其他) \end{cases}$

$f_Y(y) = \begin{cases} 2e^{-2y} & (y \geq 0) \\ 0 & (其他) \end{cases}$

$f(x,y) = e^{-2y} \quad (0<x<2,\ y>0)$

$E(x+y) = \iint f(x,y)\, d\sigma \ (x+y)$

$= \int_0^2 dx \int_0^{+\infty} (x+y) e^{-2y} dy$

$= \dfrac{3}{2}$

$E(x^2 - 2Y + 1) = \iint (x^2 - 2Y + 1) f(x,y)\, d\sigma$

$= \int_0^2 dx \int_0^{+\infty} (x^2 - 2y + 1) e^{-2y} d\sigma$

$= \dfrac{4}{3}$

(2) $E(xY) = E(x)E(Y) = 1 \times \dfrac{1}{2} = \dfrac{1}{2}$.

25.

$cov(x,y) = E(xY) - E(x)E(Y)$

$P(x=0) = 0.6$

$P(x=1) = 0.4$

$E(x) = 0.4$

$P(Y=-2) = 0.2$

$P(Y=-1) = 0.2$

$P(Y=0) = 0.2$

$P(Y=1) = 0.2$

$P(Y=2) = 0.2$

$\therefore E(Y) = 0$

$P(xY=1) = 0.2$

$P(xY=0) = 0.6$

$P(xY=-1) = 0.2$

$E(xY) = 0.$

$\therefore cov(x,y) = 0, \quad \rho(x,y) = 0$

28. $COV(X,Y) = E(XY) - E(X)E(Y)$

X	-1	0	1
P	0.25	0.5	0.25

$E(X) = 0$

Y	-1	0	1
P	0.25	0.5	0.25

$E(Y) = 0$

XY	-1	0	1
P	0	1	0

$E(XY) = 0$

$cov(x,y) = 0 \Rightarrow \rho_{xy} = 0$ 即 X, Y 不相关

$P(X=-1, Y=-1) = 0 \neq P(X=-1) \times P(Y=-1) = 0.25 \times 0.25 = \frac{1}{8}$.

即 X 与 Y 不独立.

32. $D(X-Y) = D(X) + D(Y) - 2cov(X,Y)$

$\rho(X,Y) = \dfrac{cov(X,Y)}{\sqrt{D(X)}\sqrt{D(Y)}}$ $\Rightarrow D(X-Y) = D(X) + D(Y) - 2\sqrt{D(X)}\sqrt{D(Y)}$

$= 1 + D(Y) - 2\sqrt{D(Y)}$

$D(X) = E(X^2) - (E(X))^2 = 1 - 0 = 1$

$cov(X,Y) = E(XY) - E(X)E(Y) = -1 - 0 = -1$

$\Rightarrow \dfrac{-1}{1 \times \sqrt{D(Y)}} = -\dfrac{1}{2} \Rightarrow D(Y) = 4$

$\Rightarrow D(X-Y) = 1 + 4 - 2\sqrt{4} = 1$