$e^5 \cdot \int_5^{\infty} ye^{-y}dy$ $-e^{-y}$, $-ye^{-y}|_5^{\infty}+\int_5^{\infty}(+e^{-y})$ $-e^{-y}|_5^{\infty}$

17. $X \sim U(0,1)$

则 $E(X)=\frac{1}{2}$，$D(X)=\frac{1}{12}$

$E(Y)=\int_5^{\infty} ye^{-y+5}dy=6$，$D(Y)=E(Y^2)-E^2(Y)=37-36=1$

$\therefore E(XY)=E(X)\cdot E(Y)=3$

$D(XY)=E(X^2Y^2)-E^2(XY)=E(X^2)\cdot E(Y^2)-E^2(X)\cdot E^2(Y)=\frac{10}{3}$

$D(2X-Y)=4D(X)+D(Y)=\frac{1}{3}+1=\frac{4}{3}$

18. $E(XY)=\iint xy\cdot 6xy^2dxdy=\int_0^1\int_0^1 6x^2y^3dxdy=\frac{1}{2}$

$E(2X^2+3Y)=\int_0^1\int_0^1(2X^2+3Y)6xy^2dxdy=\frac{13}{4}$

$E(X+Y)=\iint(x+y)6xy^2dxdy=\frac{17}{12}$

$E(X^2+2XY+Y^2)=\iint(x^2+2xy+y^2)6xy^2dxdy=\frac{21}{10}$

$\therefore D(X+Y)=E(X^2+2XY+Y^2)-E^2(X+Y)=\frac{67}{720}\approx 0.093$

19. $X\sim N(1,2)$，$Y\sim N(-2,1)$

$E(X)=1$，$E(Y)=-2$，$D(X)=2$，$D(Y)=1$

$E(Z)=E(2X-Y+8)=2E(X)-E(Y)+8=12$

$D(Z)=D(2X-Y+8)=4D(X)+D(Y)=9$

22(1) $E(X)=\int_a^b xf(x)dx\le\int_a^b bf(x)dx=b$

同时 $E(x)=\int_a^b xf(x)dx\ge\int_a^b af(x)dx=a$

$\therefore a\le E(X)\le b$

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

由 $a\le x\le b$ 可得 $(x-a)(x-b)\le 0 \Rightarrow x^2-(a+b)x+ab\le 0$

$\int_1^3 x^2 \cdot \frac{1}{2}$ $\frac{(a+b)^2}{4}+ab-$ $\int_1^3 x^2 \frac{1}{2}dx$

$\Rightarrow E(X^2-(a+b)X+ab)\le 0 \Rightarrow E(X^2)\le (a+b)E(X)-ab$

$\therefore D(X)\le (a+b)E(X)-ab-(E(X))^2$

$\Rightarrow D(X)\le \min\{(a+b)E(X)-ab-(E(X))^2\}$

当$E(X)$取$\frac{a+b}{2}$时，右式为$\frac{(b-a)^2}{4}$，得证

24. $E(X)=2,\ D(X)=\frac{1}{3},\ E(Y)=0,\ D(Y)=1$

$D(XY)=E(X^2Y^2)-(E(XY))^2=E(X^2)E(Y^2)-(E(X))^2(E(Y))^2$

$=E(X^2)E(Y^2)=\frac{13}{3}\cdot(1+0)=\frac{13}{3}$

25. $E(X)=\sum x_i P(x_i)=0.7$

$E(Y)=0.6$

$D(X)=E(X^2)-(E(X))^2=0.7-0.49=0.21$

$D(Y)=E(Y^2)-(E(Y))^2=0.24$

$Cov(X,Y)=E[(X-0.7)(Y-0.6)]=E(XY)+0.42-0.6E(X)-0.7E(Y)$

$=E(XY)-0.42=0.4-0.42=-0.02$

$\frac{5}{18}-\frac{50}{18}$ $\rho_{XY}=\frac{Cov(X,Y)}{\sqrt{D(X)D(Y)}}=\frac{-0.02}{\sqrt{0.21\times0.24}}=-0.089$

补充1、$(X,Y)\sim N(1,2;3,4;0.3)$

$Cov(X,Y)=\rho\sigma_1\sigma_2=0.3\times\sqrt{2}\times2\approx0.849$

$\frac{25}{9}$ $\frac{5}{2}$ $10\times\frac{1}{6}\times\frac{5}{6}$ $\frac{50}{36}$ $\frac{5\sqrt{2}}{6}$ 10 $\frac{50}{36}$ 9×10 $\frac{90}{36}$ $\frac{15}{6}$ $\frac{5}{2}$

补充2. $E(X)=\frac{5}{3}$，$E(Y)=\frac{5}{3}$

$E(XY)=\sum_{i\neq j}P(X_i=1,Y_j=1)=\sum_{i\neq j}\frac{1}{36}=\frac{10\times9}{36}=\frac{5}{2}$

$\therefore Cov(X,Y)=E[(X-\frac{5}{3})(Y-\frac{5}{3})]=\frac{5}{2}-\frac{5}{3}\times\frac{5}{3}-\frac{5}{3}\times\frac{5}{3}+\frac{5}{3}\times\frac{5}{3}$

$=-\frac{5}{18}$，$\rho_{XY}=\frac{Cov(X,Y)}{\sqrt{D(X)D(Y)}}=-\frac{1}{5}$ $(D(X)=D(Y)=\frac{50}{36})$