2.4.2.由归一化条件得 $\int_{-\infty}^{+\infty} ce^{-\sqrt{x}}dx = 1$，解得$c = \frac{1}{2}$

$F(x) = \int_{-\infty}^{x} p(x)dx = \int_{0}^{x} p(x)dx = 1 - (\sqrt{x} + 1)e^{-\sqrt{x}}$

$P(X > 2) = 1 - F(2) = (\sqrt{2} + 1)e^{-\sqrt{2}}$

2.4.3.当$x < 0$时，$p(x) = \frac{1}{2}e^{x}$，$F(x) = \int_{-\infty}^{x} p(x)dx = \frac{1}{2}e^{x}$

当$x \geq 0$时，$p(x) = \frac{1}{2}e^{-x}, F(x) = \frac{1}{2} + \int_{0}^{x} p(x)dx = 1 - \frac{1}{2}e^{-x}$

$$F(x) = \begin{cases} \frac{1}{2}e^{x},\ x < 0 \\ 1 - \frac{1}{2}e^{-x},\ x \geq 0 \end{cases}$$

2.4.4.$F(x) = \begin{cases} 0,\ x \leq 0 \\ \frac{1}{2}x^2,\ 0 < x \leq 1 \\ -\frac{1}{2}x^2 + 2x - 1,\ 1 < x \leq 2 \\ 1,\ x > 2 \end{cases}$

$P(\frac{1}{2} < X < \frac{3}{2}) = F(\frac{3}{2}) - F(\frac{1}{2}) = \frac{3}{4}$

2.5.1.由题意得，$X \sim N(1, 0.5)$

则$P(0 \leq X \leq 2) = \Phi(\frac{2-1}{\frac{\sqrt{2}}{2}}) - \Phi(\frac{0-1}{\frac{\sqrt{2}}{2}}) = 2\Phi(\sqrt{2}) - 1 = 0.8414$

2.5.2.$P(6 < X \leq 9) = \Phi(\frac{9-10}{2}) - \Phi(\frac{6-10}{2}) = 0.2857$

$P(7 \leq X < 12) = \Phi(\frac{12-10}{2}) - \Phi(\frac{7-10}{2}) = 0.7745$

$c = 10$

2.5.4.$P(-1 < X < 3) = \Phi(\frac{3-1}{\sigma}) - \Phi(\frac{-1-1}{\sigma}) = 2\Phi(\frac{2}{\sigma}) - 1 = 0.5$

所以$\Phi(\frac{2}{\sigma}) = 0.75$

查表得$\sigma = 2.96$

2.5.5.$F(x) = \begin{cases} 1 - e^{-\lambda x},\ x > 0 \\ 0,\ x \leq 0 \end{cases}$

又$P(X > 1) = 2P(X > 2)$得$e^{-\lambda} = 2e^{-2\lambda}$，解得$\lambda = ln2$

3.1.2.(1)$1 - F(a, \infty) - F(\infty, b) + F(a, b)$
(2)$F(c, \infty) - F(a - 0, \infty) - F(c, d - 0) + F(a - 0, d - 0)$
(3)$F(a, \infty) - F(a, b - 0)$
(4)$F(a, \infty) - F(a - 0, \infty) - F(a, b) + F(a - 0, b)$

3.1.3.(1)由归一化条件得，$c = \frac{1}{16}$

(2)$P(X = Y) = \frac{1}{2} + \frac{1}{16} = \frac{9}{16}$

(3)$P(X \leq Y) = 1 - P(X > Y) = 1 - \frac{1}{16} = \frac{15}{16}$

3.1.4.

X/Y	1	2	3
1	$\frac{4}{9}$	$\frac{2}{9}$	0
2	$\frac{1}{9}$	$\frac{1}{9}$	$\frac{1}{9}$

3.1.7.(1)由归一化条件得 $\iint_{0\le y\le 1-x^2} c(x^2+y) = c\int_{-1}^{1} dx\int_0^{1-x^2}(x^2+y)dy = 1$

解得$c=\frac{5}{4}$

(2)由题意得$P(Y\le X+1)=\frac{5}{4}\int_0^1 dx\int_0^{1-x^2}(x^2+y)dy+\frac{5}{4}\int_{-1}^{0} dx\int_0^{x+1}(x^2+y)dy=\frac{13}{16}$

(3) $\begin{cases} x^2+y^2=1 \\ y=x^2 \end{cases}$ 解得$x_1=\sqrt{\frac{\sqrt{5}-1}{2}}$，$x_2=-\sqrt{\frac{\sqrt{5}-1}{2}}$

$P(Y\le X^2)=\frac{5}{4}(\int_{-1}^{x2} dx\int_0^{1-x^2}(x^2+y)dy+\int_{x1}^{1} dx\int_0^{1-x^2}(x^2+y)dy+\int_{x2}^{x1} dx\int_0^{x^2}(x^2+y)dy=\frac{2-\sqrt{2}}{2}$