胡博闻 2016121518

26(1).

$$\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} A\cos x dx = 1$$

$$A = \frac{1}{2}$$

26(2).

$$\int_{0}^{\frac{\pi}{4}} \frac{1}{2}\cos x dx = \frac{\sqrt{2}}{4}$$

26(3).

$$F(x) = \begin{cases} 0 & x \in (-\infty, -\frac{\pi}{2}] \\ \frac{1}{2}\sin(x) + \frac{1}{2} & x \in (-\frac{\pi}{2}, \frac{\pi}{2}] \\ 1 & x \in (\frac{\pi}{2}, +\infty) \end{cases}$$

27.

$$\int_{0}^{\frac{1}{3}} (ax+b)dx = \int_{\frac{1}{3}}^{1} (ax+b)dx$$

$$\int_{0}^{1} (ax+b)dx = 1$$

$$a = -\frac{3}{2}, \quad b = \frac{7}{4}$$

28(1).

$$F(-\infty) = 0, \quad F(+\infty) = 1$$

$$A = \frac{1}{2}, \quad B = \frac{1}{\pi}$$

28(2).

$$F(1) - F(-1) = \frac{1}{2}$$

28(3).

$$p(x) = F^{'}(x) = \frac{1}{\pi(1+x^2)}, x \in R$$

30.

$$\begin{aligned} P(Y=2) &= C_3^2 P^2(X \leqslant \frac{1}{2}) P^1(X > \frac{1}{2}) \\ &= C_3^2 (\int_{0}^{\frac{1}{2}} 2x dx)^2 (\int_{\frac{1}{2}}^{1} 2x dx) \\ &= \frac{9}{64} \end{aligned}$$

37.

$$P(x \leqslant 10) = \int_{0}^{10} \frac{1}{5} e^{-\frac{x}{5}} dx = 1 - e^{-2}$$

$$P(Y = k) = C_5^k (e^{-2})^k (1 - e^{-2})^{5-k}$$

$$P(Y \geqslant 1) = 1 - P(Y = 0) = 1 - (1 - e^{-2})^5 = 0.5167$$

39(1).

$$\mu = 108, \sigma = 3$$

$$\begin{aligned} P(101.1 < X < 117.6) &= \Phi(\frac{117.6 - \mu}{\sigma}) - \Phi(\frac{101.1 - \mu}{\sigma}) \\ &= 0.9886 \end{aligned}$$

39(2).

$$\Phi(\frac{a - \mu}{\sigma}) = 0.9$$

$$a = 111.85$$

39(3).

$$1 - (\Phi(\frac{2b - \mu}{\sigma}) - \Phi(\frac{0 - \mu}{\sigma})) = 0.01$$

$$b = 57.495$$

47.

$$P(X < 19.6) = \Phi(\frac{19.6}{10}) = 0.975$$

$$p = P(X > 19.6) = 0.025$$

$$\lambda = np = 2.5$$

$$\begin{aligned} P(Y \geqslant 3) &= 1 - P(Y < 3) \\ &= 1 - (C_{100}^0 (1-p)^{100} + C_{99}^1 p (1-p)^{99} + C_{98}^2 p^2 (1-p)^{98}) \\ &= 1 - \frac{(\frac{\lambda^0}{0!} + \frac{\lambda^1}{1!} + \frac{\lambda^2}{2!})}{e^{-\lambda}} \\ &= 0.876 \end{aligned}$$