機統 HW3 C14096073 林昱佑

No.

Date : :

3.6

(a) $P(X \geq 200) = 1 - P(X \leq 200) = 1 - \int_0^{200} \frac{20000}{(x+100)^3}\, dx$

$= 1 - \left(-\frac{1}{2}(x+100)^{-2} \times 20000 \Big|_0^{200} \right)$

$= 0.1111$

(b) $P(80 \leq X \leq 120) = \int_{80}^{120} \frac{20000}{(x+100)^3}\, dx = -\frac{1}{2}(x+100)^{-2} \times 20000 \Big|_{80}^{120}$

$= 0.1020$

3.15 by 3.11, X is number of detective, range from 0 to 2. and $f(x) = \frac{C^2_x C^5_{3-x}}{C^7_3}$, $F(x) = \sum_{t \leq x} f(t)$

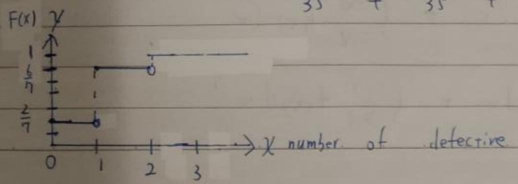
(a) $P(X=1) = F(1) - F(0) = \left(\frac{C^2_0 C^5_3}{C^7_3} + \frac{C^2_1 C^5_2}{C^7_3} \right) - \left(\frac{C^2_0 C^5_3}{C^7_3} \right)$

$= \frac{C^2_1 C^5_2}{C^7_3} = \frac{20}{35} = \frac{4}{7}$

(b) $P(0 < X \leq 2) = F(2) - F(0) = \frac{C^2_0 C^5_3}{C^7_3} + \frac{C^2_1 C^5_2}{C^7_3} + \frac{C^2_2 C^5_1}{C^7_3} - \frac{C^2_0 C^5_3}{C^7_3}$

$= \frac{10}{35} + \frac{20}{35} + \frac{5}{35} - \frac{10}{35} = \frac{5}{7}$

3.16



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3.24 let X : number of comic book be selected,

$$f(x) = \frac{C^5_x C^5_{4-x}}{C^{10}_4} \quad x = 0, 1, 2, 3, 4.$$

(C^{10}_4 way chose 4 books from 10 books, C^5_x ways choose X comic books, C^5_{4-x} ways choose $4-X$ another books)

3.30 (a) $\int_{-\infty}^{\infty} f(x)\,dx = \int_{-1}^{1} k(3-x^2)\,dx = k\left(3x - \frac{1}{3}x^3\right)\Big|_{-1}^{1}$

$= k\left(\frac{16}{3}\right) = 1$

cause $f(x)$ is a probability density function

; so $k = 1 \div \frac{16}{3} = \frac{3}{16}$

(b) $P(X \leq \frac{1}{2}) = \int_{-\infty}^{\frac{1}{2}} f(x)\,dx = \int_{-1}^{\frac{1}{2}} f(x)\,dx$

$= \frac{3}{16}\left(3x - \frac{1}{3}x^3\right)\Big|_{-1}^{\frac{1}{2}}$

$= \frac{3}{16} \times \frac{33}{8} = \frac{99}{128}$

(c) $\int_{-\infty}^{-0.8} f(x)\,dx + \int_{0.8}^{\infty} f(x)\,dx$

$= \int_{-1}^{-0.8} f(x)\,dx + \int_{0.8}^{1} f(x)\,dx$

$$= \left(\frac{9}{16}x - \frac{1}{16}x^3 \Big|_{-1}^{-0.8} \right) + \left(\frac{9}{16}x - \frac{1}{16}x^3 \Big|_{0.8}^{1} \right)$$

$$= 0.164$$

3.40

(a) $\int_0^1 f(x,y)\,dy = \int_0^1 \frac{2}{3}(x+2y)\,dy$

$= \frac{2}{3}(xy + y^2)\Big|_0^1$

$= \frac{2}{3}(x+1) \quad (0 \le x \le 1)$

(b) $\int_0^1 f(x,y)\,dx = \int_0^1 \frac{2}{3}(x+2y)\,dx$

$= \frac{2}{3}(\frac{1}{2}x^2 + 2xy)\Big|_0^1$

$= \frac{2}{3}(\frac{1}{2} + 2y) \quad (0 \le y \le 1)$

(c) $P(X \le \frac{1}{2}) = \int_{-\infty}^{\frac{1}{2}} \frac{2}{3}(x+1) = \int_0^{\frac{1}{2}} \frac{2}{3}(x+1)$

$= \frac{2}{3}(\frac{1}{2}x^2 + x)\Big|_0^{\frac{1}{2}}$

$= \frac{2}{3}(\frac{1}{8} + \frac{1}{2}) - 0$

$= \frac{5}{12}$

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3.50 (a) $g(x) = 0.1 + 0.2 + 0.1 = 0.4$ when $x=2$

$g(x) = 0.15 + 0.3 + 0.15 = 0.6$ when $x=4$

(b) $h(y) = 0.1 + 0.15 = 0.25$ when $y=1$

$h(y) = 0.20 + 0.30 = 0.50$ when $y=3$

$h(y) = 0.10 + 0.15 = 0.25$ when $y=5$