

# 機率與統計 HW3 資訊114 何寬昇 C34104032

(3.6)

$$(a) \text{所求} = \int_{200}^{\infty} f(x) dx = -10000 \cdot \frac{1}{(x+100)^2} \Big|_{200}^{\infty}$$

$$= 0 - \left( -\frac{10000}{90000} \right) = \frac{1}{9} \#$$

$$(b) \text{所求} = \int_{80}^{120} f(x) dx = \frac{-10000}{(x+100)^2} \Big|_{80}^{120}$$

$$= -10000 \cdot \left( \frac{1}{220^2} - \frac{1}{180^2} \right) = \frac{1000}{9801} \approx 0.102 \#$$

$$(3.15) f(x) = \frac{\text{defective } rest}{\binom{2}{x} \binom{5}{3-x}} = \frac{\frac{1}{7} \cdot \frac{6}{6}}{\frac{1}{35}} = 35 \quad x=0,1,2 \rightarrow \text{from (3.11)}$$

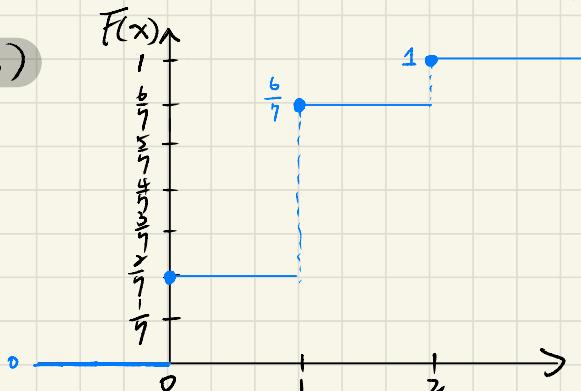
$x$	0	1	2
$f(x)$	$\frac{10}{35}$	$\frac{20}{35}$	$\frac{5}{35}$

$$\rightarrow F(x) = \begin{cases} 0, & \text{for } x < 0 \\ \frac{2}{7}, & \text{for } 0 \leq x < 1 \\ \frac{6}{7}, & \text{for } 1 \leq x < 2 \\ 1, & \text{for } 2 \leq x \end{cases}$$

$$(a) P(X=1) = F(X \leq 1) - F(X \leq 0) = \frac{6}{7} - \frac{2}{7} = \frac{4}{7} \#$$

$$(b) P(0 < X \leq 2) = F(X \leq 2) - F(X \leq 0) = 1 - \frac{2}{7} = \frac{5}{7} \#$$

(3.16)



$x$  (number of defective ones purchased by the hotel)

$$(3.24) \quad \text{Total books} = \frac{\text{comic}}{5} + \frac{\text{Art}}{2} + \frac{\text{Math}}{3} = 10$$

comic      Art      Math  
  <sup>rest</sup>  
 $\frac{(\frac{5}{x})(\frac{5}{4-x})}{(\frac{10}{4})}$

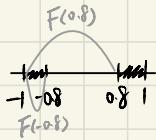
↓  
number of selected comic books

$$(a) \int_{-\infty}^{\infty} f(x) dx = 1 = \int_{-1}^1 k(3-x^2) = k(3x - \frac{x^3}{3}) \Big|_{-1}^1 \\ = k(\frac{8}{3} + \frac{8}{3}) = \frac{16}{3}k$$

$\Rightarrow k = \frac{3}{16}$  #

$$(b) F(x) = \int_{-1}^x \frac{3}{16}(3-t^2) dt, \text{ for } -1 \leq x < 1 \\ = \frac{3}{16}(3t - \frac{t^3}{3}) \Big|_{-1}^x = \frac{3}{16}(3x - \frac{x^3}{3} + \frac{8}{3}) = -\frac{x^3}{16} + \frac{9x}{16} + \frac{1}{2} \\ P(X < \frac{1}{2}) = -\frac{1}{16} \cdot (\frac{1}{2})^3 + \frac{9}{16}(\frac{1}{2}) + \frac{1}{2} = \frac{99}{128} \approx 0.77$$

$$(c) \text{所求} = P(|X| > 0.8) = P(X < -0.8) + P(X > 0.8)$$



$$= 1 - F(0.8) + F(-0.8) \\ = 1 - (-\frac{1}{16}(0.8)^3 + \frac{9}{16}(0.8) + \frac{1}{2}) + (-\frac{1}{16}(-0.8)^3 + \frac{9}{16}(-0.8) + \frac{1}{2}) \\ = \frac{41}{250} = 0.164$$



(3.40)

$$(a) \text{ 所求: } g(x) = \int_0^1 \frac{1}{3}(x+2y) dy = \frac{1}{3}(xy + y^2) \Big|_{y=0}^{y=1} = \frac{1}{3}(x+1), \text{ for } 0 \leq x \leq 1$$

$$(b) \text{ 所求: } h(y) = \int_0^1 \frac{1}{3}(x+2y) dx = \frac{1}{3}(x^2 + 4yx) \Big|_{x=0}^{x=1} = \frac{1}{3}(1+4y), \text{ for } 0 \leq y \leq 1$$

$$(c) \text{ 所求: } P(X < \frac{1}{2}) = \int_0^{\frac{1}{2}} \frac{1}{3}(x+1) dx = \frac{1}{3}(x^2 + 2x) \Big|_0^{\frac{1}{2}} = \frac{1}{3}\left(\frac{1}{4} + 1\right) = \frac{5}{12}$$

(3.50)

		x		h(y)
		2	4	
y	1	0.10	0.15	0.25
	3	0.20	0.30	0.50
	5	0.10	0.15	0.25
g(x)		0.40	0.60	

(a)

x	2	4
g(x)	0.40	0.60

(b)

y	1	3	5
h(y)	0.25	0.50	0.25