Homework 3 林業誠 E24105038 114資訊甲

3.6) a) $P(X \geq 200) = \int_{200}^{\infty} \frac{20000}{(x+100)^3} dx$

$= -\frac{20000}{2}\left[\frac{1}{(x+100)^2}\right]\Big|_{200}^{\infty}$

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

$\boxed{= \frac{1}{9}}$ #

b) $P(80 \leq X \leq 120) = \int_{80}^{120} \frac{20000}{(x+100)^3} dx$

$= -\frac{20000}{2}\left[\frac{1}{(x+100)^2}\right]\Big|_{80}^{120}$

$= -10000\left(\frac{1}{240^2} - \frac{1}{180^2}\right)$

$\boxed{= \frac{1000}{9801}}$ #

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

(a) $P(X=1) = P(X \leq 1) - P(X \leq 0)$

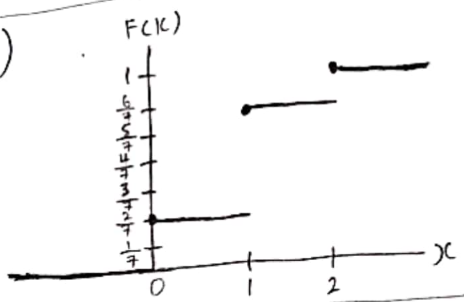
$= \frac{6}{7} - \frac{2}{7}$

$\boxed{= \frac{4}{7}}$ #

(b) $P(0 < X \leq 2) = P(X \leq 2) - P(X \leq 0)$

$= 1 - \frac{2}{7}$ $\boxed{= \frac{5}{7}}$ #

3.16)



3.24) X = number of comic books when 4 books are selected

$\therefore \boxed{f(x) = \frac{\binom{5}{x}\binom{5}{4-x}}{\binom{10}{4}}, \quad x = 0,1,2,3,4}$ #

3.30) (a) $\because \int_{-1}^{1} f(x)dx = 1$

$k\int_{-1}^{1}(3-x^2)dx = 1$

$k\left[3x - \frac{x^3}{3}\right]\Big|_{-1}^{1} = 1$

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

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

$\boxed{\therefore k = \frac{3}{16}}$ #

(b) $P(X < \frac{1}{2}) = \int_{-1}^{\frac{1}{2}}\left(\frac{3}{16}\right)(3-x^2)dx$

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

$= \frac{3}{16}\left(\frac{3}{2} - \frac{1}{24} + 3 - \frac{1}{3}\right)$

$\boxed{= \frac{99}{128}}$ #

(c) $P(|X| > 0.8) = P(X < -0.8) + P(X > 0.8)$

$= \int_{-1}^{-0.8}\left(\frac{3}{16}\right)(3-x^2)dx + \int_{0.8}^{1}\left(\frac{3}{16}\right)(3-x^2)dx$

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

$= \frac{3}{16}\left[\left(-2.4 + \frac{64}{375} + 3 - \frac{1}{3}\right) + \left(3 - \frac{1}{3} - 2.4 + \frac{64}{375}\right)\right]$

$\boxed{= \frac{41}{250}}$ #

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

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

$= \frac{2}{3}(x+1)$ $\boxed{= \frac{2}{3}x+\frac{2}{3},\ \text{for } 0 \le x \le 1}$ #

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

$= \frac{2}{3}\left[\frac{x^2}{2}+2xy\right]\Big|_0^1$

$= \frac{2}{3}\left(\frac{1}{2}+2y\right)$

$\boxed{= \frac{1}{3}+\frac{4}{3}y,\ \text{for } 0 \le y \le 1}$ #

(c) $P(X < \frac{1}{2}) = \int_0^{\frac{1}{2}} \frac{2}{3}x + \frac{2}{3}\,dx$

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

$= \frac{2}{3}\left(\frac{1}{8}+\frac{1}{2}\right)$

$= \frac{2}{3}\left(\frac{5}{8}\right)$ $\boxed{= \frac{5}{12}}$ #

3.50) ∵

$f(x,y)$		x = 2	x = 4	$h(y)$
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	1

(a) ∴

x	2	4
$g(x)$	0.40	0.60

#

(b) ∴

y	1	3	5
$h(y)$	0.25	0.50	0.25

#