

2012 P2 Q7

$$(i) \quad \underline{P}(X=0) + \underline{P}(X=2) + \underline{P}(X=3) = 1$$

$$k\left(\frac{5}{2}\right) + k\left(\frac{1}{2}\right) + k = 1$$

$$\Rightarrow k = \frac{1}{4}$$

(ii)

x	0	2	3
$P(X=x)$	$\frac{5}{8}$	$\frac{1}{8}$	$\frac{1}{4}$

$$E(X) = \frac{1}{8} \times 2 + \frac{1}{4} \times 3$$

$$= 1. \quad //$$

$$\text{Var}(X) = E(X^2) - E(X)^2$$

$$= \frac{1}{8} \times 2^2 + \frac{1}{4} \times 3^2 - 1^2$$

$$= \frac{7}{4}. \quad //$$

(iii)

x	0	1	2	3
$P(X_1 - X_2 = x)$	$\frac{15}{32}$	$\frac{1}{16}$	$\frac{5}{32}$	$\frac{5}{16}$

$(0,0)$ $(3,2)$ $(0,2)$ $(0,3)$
 $(2,2)$ $(2,3)$ $(2,0)$ $(3,0)$
 $(3,3)$