

S2 - JUNE 2013 (R)

		Range		
1. a)	(1,1,1)	$(\frac{2}{3})^3 = \frac{8}{27}$	0	X=counter
	(1,1,5)	$(\frac{2}{3})(\frac{2}{3})(\frac{1}{3}) = \frac{4}{27}$	4	x
	(1,5,1)	$\frac{4}{27}$	4	P(X=x)
	(5,1,1)	$\frac{4}{27}$	4	$\frac{1}{3}$
	(1,5,5)	$(\frac{2}{3})(\frac{1}{3})(\frac{1}{3}) = \frac{2}{27}$	4	$\frac{5}{3}$
	(5,1,5)	$\frac{2}{27}$	4	
	(5,5,1)	$\frac{2}{27}$	4	
	(5,5,5)	$(\frac{1}{3})^3 = \frac{1}{27}$	0	
b)	R	0	4	
	P(R=v)	$\frac{1}{3}$	$\frac{2}{3}$	

$$2 \text{ a) } F(2) = \frac{1}{4} (2^3 - 4 \cdot 2^2 + 2k) = \frac{1}{4} (2k - 8) = 1$$

$$2k - 8 = 4$$

$$k = 6$$

$$b) \quad f(y) = \begin{cases} \frac{1}{4} (3y^2 - 8y + 6) & 0 \leq y \leq 2 \\ 0 & \text{otherwise} \end{cases}$$

$$c) \quad P(Y > 1) = 1 - P(Y \leq 1) = 1 - F(1)$$

$$= 1 - \frac{1}{4} (1 - 4 + 6) = \frac{1}{4}$$

3 a) $X \sim U[a, b]$

$$E(X) = 23 = \frac{a+b}{2}$$

$$\text{Var}(X) = 75 = \frac{(b-a)^2}{12}$$

$$a+b=46$$

$$b=46-a$$

$$900 = (b-a)^2$$

$$900 = (46-2a)^2$$

$$\pm 30 = 46-2a$$

$$30 = 46-2a$$

$$-30 = 46-2a$$

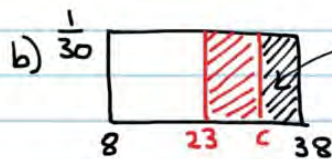
$$a=8$$

$$b=38$$

$$a=38$$

$$b=8$$

Reject as we need $a < b$



0.32

$$P(23 < X < c) = 0.5 - 0.32 = 0.18$$

4. a) $\int_0^3 k(3+2x-x^2) dx = k \left[3x + \frac{2x^2}{2} - \frac{x^3}{3} \right]_0^3 = 9k = 1 \Rightarrow k = \frac{1}{9}$

b) $\frac{d}{dx} [f(x)] = \frac{1}{9} (2-2x) = 0 \Rightarrow x=1$

$\therefore \text{Mode} = 1$

You need to find the peak of $f(x)$

c) $E(X) = \int_0^3 x \cdot \frac{1}{9} (3+2x-x^2) dx = \frac{1}{9} \int_0^3 (3x+2x^2-x^3) dx$

$$= \frac{1}{9} \left[\frac{3x^2}{2} + \frac{2x^3}{3} - \frac{x^4}{4} \right]_0^3 = \frac{1}{9} \left(\frac{27}{2} + 18 - \frac{81}{4} \right) = \frac{5}{4}$$

d) $\text{Mean} > \text{mode} \Rightarrow \text{Positive skew}$