Of course, in this case, the shibboleth is particularly silly, because one criterion indicates positive skewness, and one indicates negative.

(f) (a) Mean reduced by 5; s.d. unchanged

(b) median reduced by 5

(c) Q_1 reduced by 5

(d) IQR unchanged.

(Q5)

x	1	2	3	4	5	6	TOTALS	
$p(x)$	a	a	a	b	b	0.3	$3a+2b+0.3=1$	(i)
$x\,p(x)$	$a=0.1$	$2a=0.2$	$3a=0.3$	$4b=0.8$	$5b=1$	1.8	$6a+9b+1.8=4.2$	(ii)
$x^2 p(x)$	0.1	0.4	0.9	3.2	5	10.8	20.4	

(a) (ii) − 2(i): $5b + 1.8 - 0.6 = 4.2 - 2$

$\therefore\ b = \frac{2.2 - 1.2}{5} = 0.2$ (Ans)

9(i) − 2(ii): $(27-12)a + 2.7 - 3.6 = 9 - 8.4$

$\therefore\ a = \frac{0.6 + 0.9}{15} = \frac{1.5}{15} = 0.1$ (Ans)

Check: $0.1 + 0.1 + 0.1 + 0.2 + 0.2 + 0.3 = 1$ ✓

(b) Substituting a and b in the $x\,p(x)$ line and multiplying by the x line to get the $x^2 p(x)$ line, we get from the table that $E(x^2) = 20.4$ ☐

(c) $Var(X) = E(X^2) - E(X)^2 = 20.4 - 4.2^2 = 2.76$

$Var(5-3X) = (-3)^2 Var(X) = 9 \times 2.76 = 24.84$ (Ans)

(d) As the die has 5 faces, 5 is the largest possible value of y, so $1 = F(5) = 5k$, giving $k = 0.2$ (Ans)

(e)

y	1	2	3	4	5
$F(y)$	0.1	0.2	0.6	0.8	1
$p(y)$	0.1	0.1	0.4	0.2	0.2

(Ans)

(5) P(sum = 2) = P(both sums are 1) = 0.1^2 = 0.01 (ANS)

(Q6) Given. $W \sim N(\mu, 7.8^2)$

(a) 0.1 = P(Z > 1.2816)

||

$P(W < 200) = P\left(\frac{W-\mu}{7.8} < \frac{200-\mu}{7.8}\right) = P\left(Z > \frac{\mu - 200}{7.8}\right)$

p	z
0.5000	0.0000
0.4000	0.2533
0.3000	0.5244
0.2000	0.8416
0.1500	1.0364
0.1000	1.2816

$\therefore$ $1.2816 = \frac{\mu - 200}{7.8}$

$\therefore$ $\mu = 1.2816 \times 7.8 + 200$ = 209.99648 (ANS)

(= 210.00 to 5 sf
= 210.0 to 4 sf
= 210 to 3 s.f
= 210 to 2 sf)

(b) $P(W > 225) = P\left(\frac{W - 209.99648}{7.8} > \frac{225 - 209.99648}{7.8}\right)$

= P(Z > 1.9235282051282051282051282051282051282)

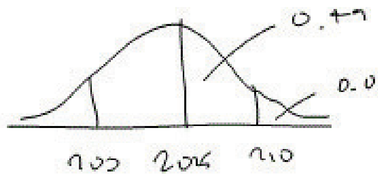
(using Casio fx - 991 ES+ calculator)	(using tables without interpolation)	(using tables with interpolation)
= 0.027207	$\simeq 1 - \Phi(1.92)$ = 1 − 0.9726 = 0.0274	$= 1 - \Phi(1.9235...)$ $= 1 - \left[\Phi(1.92) + \frac{0.0035...}{0.01}(\Phi(1.93) - \Phi(1.92))\right]$ = 1 − (0.9726 + 0.3578... (0.0006)) = 0.027185 83...

1.92	0.9726
1.93	0.9732

= 0.027 to 2 s.f.

= 2.7 % to 2 s.f. (ANS)

(c)



$W_2 \sim N(205, \sigma^2)$

0.01 = P(Z > 2.3263)

||

$P(W_2 > 210) = P\left(\frac{W - 205}{\sigma} > \frac{5}{\sigma}\right) = P\left(Z > \frac{5}{\sigma}\right)$

$\therefore$ $2.3263 = \frac{5}{\sigma}$

p	z
0.0500	1.6449
0.0250	1.9600
0.0100	2.3263
0.0050	2.5758
0.0010	3.0902
0.0005	3.2905

$\therefore$ $\sigma = \frac{5}{2.3263}$ = 2.149335855220736792331169668572 = 2.15 to 3 sf