Discrete Random Variables Exam Questions MS (from Legacy MEI S1)

Q1 (Jun 2016, Q4) [Modified]

(i)		$k/2 + k/6 + k/12 + k/20 + k/30 = 1$ $(30 + 10 + 5 + 3 + 2)k/60 = 1$ $50k = 60$ $k = 1.2$	M1 A1	For correct equation including = 1 Need one further intermediate step after equation NB **Answer Given**	Allow substitution of $k = 1.2$ to show probabilities add to 1 with convincing working which must be more than just 1.2/2+1.2/6+1.2/12+1.2/20+1.2/30 = 1 This latter gets M1A0
		r: 2 | 3 | 4 | 5 | 6 $P(X = r)$: 0.6 $= 3/5$ | 0.2 $= 1/5$ | 0.1 $= 1/10$ | 0.06 $= 3/50$ | 0.04 $= 1/25$	B1 **[3]**	Complete correct table in fraction or decimal form NOT in terms of k	Must tabulate probabilities, though may be seen in part(ii) If fractions any denominator is ok provided numerators are integers

Q2 (Jun 2014, Q5) [Modified]

(i)		$k + 0.01 + k + 0.04 + k + 0.09 + k + 0.16 + k + 0.25 = 1$ $5k + 0.55 = 1$ $k = 0.09$	M1 A1	For equation in k NB **Answer Given**	Allow substitution of $k = 0.09$ to show probabilities add to 1 with convincing working
		r: 1 | 2 | 3 | 4 | 5 $P(X = r)$: 0.1 | 0.13 | 0.18 | 0.25 | 0.34	B1 **[3]**	Complete correct table	Must tabulate probabilities, though may be seen in part(ii)

Q3 (Jan 2013, Q2) [Modified]

<table><tr><td>r</td><td>2</td><td>3</td><td>4</td><td>5</td></tr><tr><td>$P(X=r)$</td><td>$3k$</td><td>$8k$</td><td>$15k$</td><td>$24k$</td></tr></table> $3k + 8k + 15k + 24k = 1$ $k = 0.02$	B1 M1 A1 **[3]**	For correct table (ito k or correct probabilities 0.06, 0.16, 0.30, 0.48) or $k = 1/50$ (with or without working)	For their four multiples of k added and =1. Allow M1A1 even if done in part **(ii)** – link part **(ii)** to part **(i)**

Q4 (Jan 2011, Q4) [Modified]

$2k + 6k + 12k + 20k + 30k = 1,\ 70k = 1$ $k = \frac{1}{70}$	M1 A1 NB **ANSWER GIVEN**	**2**	For five multiples of k (at least four correct multiples) Do not need to sum or =1 for M1 Condone omission of either $70k = 1$ or $k = 1/70$ but not both Condone omission of k: 2+6+12+20+30=70 Allow substitution of $k = 1/70$ into formula and getting at least four of 2/70, 6/70, 12/70, 20/70, 30/70 for M1 and 2/70+6/70+12/70+20/70+30/70 = 1 for A1

Q5, (Edexcel 6683, Jan 2007, Q3)

(a) N.B. Part (a) doesn't have to be in a table, could be a list P($X = 1$) = …etc — B1, B1, B1

x	1	2	3	4	5	6
$P(X = x)$	$\frac{1}{36}$	$\frac{3}{36}$	$\frac{5}{36}$	$\frac{7}{36}$	$\frac{9}{36}$	$\frac{11}{36}$

0.0278, 0.0833, 0.139, 0.194, 0.25, 0.306 (Accept awrt 3 s.f) (3)

(b) P(3) + P(4) + P(5) =, $\frac{21}{36}$ or $\frac{7}{12}$ or awrt 0.583 — M1, A1 (2)

Q6, (Edexcel 6683, Jan 2008, Q7)

(a) $P(R = 3 \cap B = 0) = \frac{1}{4} \times \frac{1}{4}, = \frac{1}{16}$ — **M1, A1** **(2)**

(b)

3	0	3	6	9
2	0	2	4	6
1	0	1	2	3
0	0	0	0	0
B / R	0	1	2	3

All 0s **B1**
All 1,2,3s **B1**
All 4,6,9s **B1**
(3)

(c) $a = \frac{7}{16}, b = c = d = \frac{1}{16}$ — **B1, B1 B1** **(3)**

Q7, (Edexcel 6683, Jan 2011, Q6a,e-g)

(a) $k + 2k + 3k + 4k = 1$ or $10k = 1$
$k = 0.1$ (*) [allow verification with a comment e.g. "so $k = 0.1$"] — B1cso (1)

(e) $P(1,3) + P(2,2) = 2 \times 0.1 \times 0.3 + 0.2 \times 0.2 = 0.1$ (*) — M1 A1cso (2)

(f)

$X_1 + X_2$	2	3	4	5	6	7	8
p	0.01	0.04	0.1	**0.2**	0.25	0.24	**0.16**

B1 B1 (2)

(g) $P(2) + P(3) = 0.05$ — M1A1 (2)

[14]