
Question 1

(a) $(190 \div 300) \times 50$
 $= 32$

(b) $P(10B) \times P(11B)$
 $= \frac{100}{190} \times \frac{50}{110}$
 $= \frac{50}{209}$ (oe)

(c) i) $\frac{150}{300} \times \frac{149}{299}$ (oe)
 $= \frac{149}{598}$ (oe)

ii) $\frac{190}{300} \times \frac{100}{299}$ (oe)
 $2 \times \frac{190}{300} \times \frac{110}{299}$

$\left[1 - \left(\frac{190}{300} \times \frac{189}{299} + \frac{110}{300} \times \frac{109}{299} \right) \right]$ M2

$= \frac{418}{897}$ (oe)

Notes:

(a) M1 for correct process, condone 1 slip (31.6/31.7 seen M1)
A1 cao

(b) M1
A1 cao (accept 0.239 or better) allow percentages.

(c) i) M1 for correct process, (condone arithmetical slip but must be conditional)
A1 cao (accept 0.249
or better)

ii) M1 for correct process (condone arithmetical slip but must be conditional)
A1 cao (accept 0.466
or better)

[If $n = 50$ used see
alternative solutions on extra sheets].

Question 2

(a) $1000 \times 0.7 = 700$ (C)

(b) $0.6 \times 0.7 = 0.42$ (B)

(c) $0.6 \times 0.3 = 0.18$ (B)

(d) $P(\text{pass}) + P(\text{fail}) \times P(\text{pass})$
 $0.7 + 0.3 \times 0.7 = 0.91$ (A*)

Question 3

- (a) 300
(b) {3,H}; {1,H}; {2,H}; {4,H}; {5,H}; {1,T}; {2,T}; {3,T}; {4,T}; {5,T}
(c) i) $1 - (0.36 + 0.1 + 0.25 + 0.15) = 0.14$ oe
ii) 0
iii) 1

Notes:

- (a) B1
(b) B2 for all 10 [condone {3,H} absent]
B1 if 6 correct
(c) i) M1
A1 cao
ii) B1 cao Accept 0, 0, 0.0, zero, nought. Do not accept 1 5
"no possibility", "no chance"
iii) B1 cao

Question 4

- i) $0.2 \times 0.3 = 0.06$
ii) $1 - 0.3$ or $1 - 0.2$ (oe)
 $0.2 \times "0.7" + "0.8" \times 0.3 = 0.38$

Notes:

- i) M1 for 0.2×0.3 seen on its own
A1 cao
ii) M1
M1 (dep on previous M1)
A1 cao

Question 5

- i) $\frac{1}{4} \times \frac{1}{4} = \frac{1}{16}$
ii) $2 \times \frac{1}{4} \times \frac{1}{3} = \frac{1}{6}$

Notes:

- i) M1 $\frac{1}{4} \times \frac{1}{4}$
A1 cao [0.06 or better]
ii) M1 $\frac{1}{4} \times \frac{1}{3}$
M1 x #2 (dep)
A1 cao [0.17, 0.16 or better]

Question 6

(a) $3p + p = 1$ or $1:3$

$$p = 0.25$$

$$"0.25" \times 232$$

$$= 58$$

(b) $PC \text{ "a"} \times \frac{48}{8} = 348 \text{ pkts}$

$$COC (232 - \text{"a"}) \times \frac{48}{8}$$

16

$$= 522 \text{ pkts}$$

$$\frac{(PC + COC)}{232 \times 48} = \frac{870}{11136} = \frac{5}{64}$$

$$= 0.07812$$

Alternative

$$p \times \frac{1}{8} + (1 - p) \times \frac{1}{8}$$

16

Notes:

(a) M1 (oe method to find probs)

A1 cao for $p = 0.25$

A1 cao

(b) M1 $PC \text{ "a"} \times 48 \div 8$ or $\text{"a"} \times 6$ (oe for COC)

M1 dep

A1 cao anything rounding up to 0.08

Alternative

M1 for $p \times \frac{1}{8}$

M1 dep full expression

A1 cao

Question 7

(a) 0.27×0.17
 $= 0.0459$

(b) 0.27×0.17 (0.0459)
 0.27×0.83 (0.2241)
 0.73×0.17 (0.1241)
 $= 0.3941$

or

$1 - 0.73 \times 0.83$
 $= 1 - 0.6059$
 $= 0.3941$

Notes:

(a) M1 for 0.27×0.17
A1 cao

(b) M1 at least 2 or 3 cases identified correctly
M1 \times , M1 + 2 or 3 correct cases (dep) to get a final answer
A1 cao
M2 for $1 - \text{Prob}$ (no breakdown)
M1 (dep) for 0.73×0.83
A1 cao

Question 8

$$\frac{4}{20} \times \frac{3}{19} \left(= \frac{12}{380} \right)$$

$$\frac{10}{20} \times \frac{9}{19} \left(= \frac{90}{380} \right)$$

$$\frac{6}{20} \times \frac{5}{19} \left(= \frac{30}{380} \right)$$

$$\frac{(12 + 90 + 30)}{380} = \frac{132}{380} = \frac{33}{95} = 0.347$$

Notes:

B1 for any of the 3 products seen

M1 for adding 3 correct products

A1 for $\frac{132}{380}$ or $\frac{33}{95}$ or 0.347

Question 9

$$(0.8)^n < \frac{1}{4}$$

$$(0.8)^6 = 0.26... \qquad (0.8)^8 = 0.16...$$

$$(0.8)^7 = 0.209...$$

$$n = 7$$

Notes:

M1 for $(0.8)^n$ used for $n \geq 2$ (possibly implied)

M1 for final trial with $6 \leq n \leq 8$

A1 for $n = 7$

Question 10

i) $0.0625 \times 0.032 \times 0.044 = 0.0000915$

ii) $0.065 \times 0.968 \times 0.954 = 0.06$

iii) $0.935 \times 0.968 \times 0.954 = 0.863$

Question 11

i) $0.65 \times 0.8 = 0.52$

ii) $1 - 0.65 (= 0.35)$

$$1 - 0.8 (= 0.2)$$

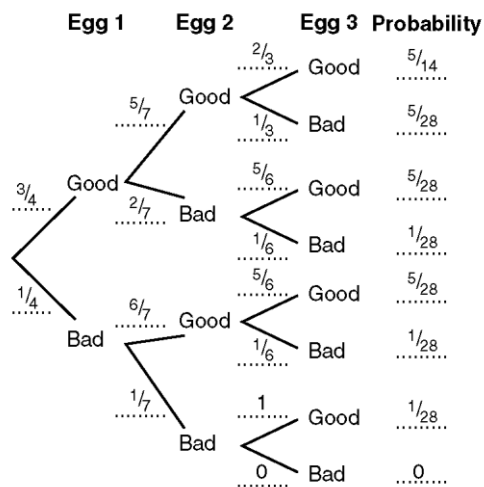
$$0.35 \times 0.2 = 0.07$$

Question 12

- i) $0.0625 \times 0.032 \times 0.044 = 0.0000915$
 - ii) $0.065 \times 0.968 \times 0.954 = 0.06$
 - iii) $0.935 \times 0.968 \times 0.954 = 0.863$
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Question 13

(a)



(A)

(b) $\frac{3}{4} \times \frac{5}{7} \times \frac{2}{3} = \frac{5}{14}$ (A*)

(c) $1 - \text{(b)} = \frac{9}{14}$ (A*)

Question 14

(a) [AW]

(b) i) $\frac{5}{12} \times \frac{5}{12} = \frac{25}{144}$

ii) $\left(\frac{5}{12} \times \frac{7}{12}\right) + \left(\frac{7}{12} \times \frac{5}{12}\right) = \frac{35}{72}$

Notes:

(a) B1 LHS (oe)

B1 RHS (oe) ft on probability values used on LHS

In each case (oe) is a % or a decimal to a minimum of 2 dp on LHS.

NB: Probabilities must add to 1 on each pair of branches.

$$\frac{5}{12} = 0.416, \frac{7}{12} = 0.583$$

(b) i) M1 $\frac{5}{12} \times \frac{5}{12}$

A1 cao (oe) 0.17(3611...)

ii) M1 $\left(\frac{5}{12} \times \frac{7}{12}\right)$

M1 () + () (dep); OR $2 \times ()$

A1 cao (oe) 0.48(611...) or 0.49

SC: if without replacement, then allow B1 on (a), M1 $\times 3$ for (b),

B1 for both $\frac{5}{33}, \frac{35}{66}$ (0.15..., 0.53030...)

Question 15

(a) 0.05; 0.2; 0.2

(b) 0.76

(c) 0.23