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Mark Scheme (Results)

January 2015

Pearson Edexcel Level 2 Award in Statistical Methods (AST20)

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NOTES ON MARKING PRINCIPLES

1 All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.

2 Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.

3 All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.

4 Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.

5 Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

6 Mark schemes will indicate within the table where QWC is being assessed. The strands are as follows:

i) *ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear*
Comprehension and meaning is clear by using correct notation and labeling conventions.

ii*) select and use a form and style of writing appropriate to purpose and to complex subject matter*
Reasoning, explanation or argument is correct and appropriately structured to convey mathematical reasoning.

iii) *organise information clearly and coherently, using specialist vocabulary when appropriate*.
The mathematical methods and processes used are coherently and clearly organised and the appropriate mathematical vocabulary used.

7 With working

If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.

If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.

If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks. Send the response to review, and discuss each of these situations with your Team Leader.

If there is no answer on the answer line then check the working for an obvious answer.

Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks. Discuss each of these situations with your Team Leader.

If there is a choice of methods shown, then no marks should be awarded, unless the answer on the answer line makes clear the method that has been used.

8 Follow through marks

Follow through marks which involve a single stage calculation can be awarded without working since you can check the answer yourself, but if ambiguous do not award.

Follow through marks which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

Guidance on the use of codes within this mark scheme
M1 – method mark A1 – accuracy mark B1 – Working mark C1 – communication mark QWC – quality of written communication oe – or equivalent cao – correct answer only ft – follow through sc – special case dep – dependent (on a previous mark or conclusion) indep – independent isw – ignore subsequent working awrt – answer which rounds to

Paper: AST20_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
1			Complete composite bar chart	3	M1 for one correct partition A1 for all correct partitions B1 for correct shading for their partitions which matches their key
2	(a)	81 ÷ 2 = 40.5 therefore the median is the 40^{th} and 41^{st} value	3	2	M1 for $40^{th}$and 41st value needed or 81 ÷ 2 = 40.5 A1 cao
	(b)	(1×16 + 2×19 + 3×18 + 4×15 + 5×11 + 6×1) ÷80 = 229 ÷ 80	2.8625	3	M1 for *fx* (may be implied by 229) M1 dep for $\sum fx \div 80$ A1 for 2.86-2.87
3	(a)		Discrete Continuous	2	B2 for all correct B1 for one correct
	(b)		Outlier circled	1	B1 for correctly circled outlier
	(c)		Negative	1	B1 for negative accept e.g. carbon monoxide increases as nitrogen oxide decreases oe
	(d)		Line of best fit	1	B1 for suitable line of best fit
	(e)		1150-1450	1	B1 for answer between 1150 and 1450 or ft from sensible line of best fit

Paper: AST20_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
4	(a)		Frequency polygon	2	M1 for plotting consistent within each interval including ends (condone 1 error) A1 cao (Ignore the segments drawn outside the range of points)
	(b)		2 aspects	2	B2 for 2 correct aspects from, e.g. 1. Range of Albert is greater than Range of Bruna. 2. Bruna was on the phone for longer 3. Albert has positive skew and Bruna has negative skew 4. Frequency of the modal class for Albert is greater than the frequency of the modal class for Bruna (B1 for one correct aspect)
5	(a)		0.35	2	M1 for 0.20 + 0.15 A1 for 0.35 oe
	(b)		0.30	2	M1 for 1 – (0.20 + 0.25 + 0.15 + 0.10) A1 for 0.30 oe
	(c)		62 or 63	2	M1 for 0.25 × 250 (= 62.5) A1 for 62 or 63
	(d)	$\frac{80}{5}=16$	Correct reason	1	B1 for correct reason, e.g. There are more 4's than expected oe

Paper: AST20_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
6			3 features identified	3	B3 for 3 correct features from (B2 for 2 features) (B1 for 1 feature) 3D oe No vertical scale oe Broken bar oe No title oe
7	(a)		24, 52, 86, 110,120	1	B1 for cao
	(b)		(10,10), (20,24),(30, 52),(40, 86), (50,110), (60, 120) with curve or line segments	2	M1 for points plotted consistently in each segment and joined with a curve or line segments ft part (a) condone 1 error A1 cao
	(c)(i)		33	3	B1 for 31-35 or ft from their sensible cf diagram
	(c)(ii)		19		M1 for correct use of cf graph to find 'uq'-'lq' A1 for 17-21 or ft from their sensible cf diagram
8	(a)		$110 < t \leq 130$	1	B1 for cao
	(b)		$90 < t \leq 110$	1	B1 for cao
	(c)	(80×6 + 100×10 + 120×11 + 140×3) = 3220 ÷ 30	107.3	4	M1 for fx with x consistent within interval (including end points), may be implied by 3220 condone 1 error in multiplication M1 (dep) for use of midpoints condone 1 error M1 (dep on first M1) for use of $\sum fx \div 30$ A1 for 107.3-107.4 accept $107\frac{1}{3}$

Paper: AST20_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
9	(a)		Disadvantage	1	B1 for disadvantage, e.g. may not be representative
	(b)		Question + response box	2	B1 for suitable question B1 for at least 3 non-overlapping exhaustive response boxes. (NB a time frame must appear with question or response boxes)
	(c)		Reason	1	B1 for suitable reason, e.g. could be biased oe
10	(a)		Positive	1	B1 for cao
	(b)(i)		50	1	B1 for cao
	(ii)		41	1	B1 for cao
	(iii)		55	1	B1 for cao
	(c)		Box plot	2	M1 for box plot and 3 correct values plotted ft part (b) A1 ft for all correct
	(d)		2 comparisons	2	B2 ft for two correct comparisons from 1. Median for Kay > Median for Ravi 2. Range for Ravi > Range for Kay or IQR for Ravi > IQR for Kay 3. Kay negative skew and Ravi positive skew (If (a) is negative then Kay ft should be positive)

Paper: AST20_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
11	(a)	$\frac{1263}{1196} \times 100$	105.6	2	M1 for $\frac{1263}{1196} \times 100$ A1 for awrt 105.6
	(b)		2 correct comments	2	B1(ft) for increase of '5.6'% (Mathcom) or increase of 9.3% (Statcom) B1 (ft) for e.g. Mathcom had the smaller % increase or Statcom had the greater % increase
12	(a)	$\frac{108 + 92 + 154}{3} = 118$	118	2	M1 for $\frac{108+92+154}{3}$ A1 cao
	(b)		Upwards	1	B1 for upwards oe
13	(a)		5 6 5 6 7 5 6 7 8	2	B2 for all correct B1 for at least 4 correct
	(b)(i)		$\frac{1}{12}$	3	B1 for $\frac{1}{12}$ oe
	(ii)		$\frac{6}{12}$		M1 $\frac{a}{12}$ for a <12 or $\frac{6}{b}$ for b>6 A1 for $\frac{6}{12}$ oe

Paper: AST20_01				
Question	**Working**	**Answer**	**Mark**	**Notes**
14 (a)		Complete probability tree diagram	2	B1 for correct probabilities on first essay branches (0.85, 0.15) B1 for correct probabilities on both second essay branches (0.9, 0.1)
(b)		0.765	2	M1 for '0.85' × '0.9' A1 for 0.76-0.77 oe
(c)		0.22	3	M1 for '0.85' × '0.1' or '0.15' × '0.9' M1 for '0.85' × '0.1' + '0.15' × '0.9' A1 for 0.22 oe
15	$\frac{81}{400}\times 60$	12	2	M1 for $\frac{81}{400}\times 60$ (=12.15) A1 for 12
16	$\frac{(12\times 16.7)+(18\times 17.2)}{30}$ $\frac{200.4+309.6}{30}$ $\frac{510}{30}$	17	4	M1 for 12×16.7(=200.4) or 18×17.2(=309.6) M1 for 12×16.7(=200.4) and 18×17.2(=309.6) M1 (dep on first M1) $\frac{'200.4'+'309.6'}{30}$ A1 for cao
17	Mean= 195÷25=7.8 Var= (6840÷25) – $(7.8)^2$ = 273.6 - 60.84 SD= √212.76 = 14.58629494.....	14.6	3	M1 for 195÷25(=7.8) or 6840 ÷ 25(=273.6) M1 for (6840÷25) – $(195\div 25)^2$ A1 for 14.5 – 14.6

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