Statistics 1 Numerical Measures Answers

3(a)	Mean $= \frac{286.5}{50} = 5.73$	B1		CAO
	Standard deviation $= \sqrt{\frac{45.16}{49 \text{ or } 50}} =$			
	0.95 to 0.961	B1	2	AWFW
(b)	99% $\Rightarrow z = 2.57$ to 2.58	B1		AWFW 2.5758
	CI for μ is $\bar{x} \pm z \times \frac{(\sigma \text{ or } s)}{\sqrt{n}}$	M1		Use of Must have $\left(\div\sqrt{n}\right)$ with $n > 1$
	Thus $5.73 \pm 2.5758 \times \frac{(0.95 \text{ to } 0.961)}{\sqrt{50}}$	A1√		√ on z and $s^2 > 0$ but not on $\bar{x}$ Accept only 50 or 49 for n
	$5.73 \pm (0.34 \text{ to } 0.36)$	↑		Dependent
	5.37 to 5.39, 6.07 to 6.09)	A1	4	AWFW
(c)	**CI excludes both values** of 5 and 6½ so **Neither claim** appears **valid**	B1√ ↑ B1√		√ on (b); OE Dependent √ on (b); OE
	or			
	CI excludes 5 so claim not valid and CI excludes 6½ so claim not valid	(B1√) (B1√)	2	√ on (b); OE √ on (b); OE
	Total		**8**	

4(a)	$\Sigma fx = 8025$ $\Sigma fx^2 = 739975$			
	Mean $(\bar{x}) = 80.2$ to 80.3	B2		AWFW 80.25
	Standard Deviation $(s_n, s_{n-1}) = 30.9$ to 31.2	B2		AWFW 30.97882 or 31.13489
	MPs (x): 25, 35, 50, 70, 90, 110, 135, 165	(B1)		At least 4 correct
	Mean $(\bar{x}) = \frac{\Sigma fx}{100}$	(M1)	4	Use of

(b)(i)	Mean, $\mu = np = 15 \times 0.4 = 6$	B1		CAO
	Variance, $\sigma^2 = np(1-p) = 6 \times 0.6 = 3.6$	M1		use of $\sigma^2 = np(1-p)$
	Standard deviation = $\sqrt{3.6} = 1.89$ to 1.9	A1	3	AWFW; or equivalent
(ii)	Mean, $\bar{x} = 6$	B1		CAO ($\Sigma x = 60$) CSO if evidence of $np(1-p)$ or 1.9
	Standard deviation, s or $\sigma = 2.82$ to 2.99	B1	2	AWFW; or equivalent. ($\Sigma x^2 = 440$)
(iii)	Means are same/equal	B1√		√ on 2 means; accept $\frac{6}{15} = 0.4$ if not contradicted by $\bar{x}$ in (ii)
	Standard deviations are different	B1 dep		dependent on 2 correct SDs
	Reason to doubt validity of Kirk's claim	B1 dep	3	dependent on 2 correct SDs

---

1(a)	Mean $(\bar{x})$ = 39.3 to 39.4	B1		AWFW (39.35)
	Standard Deviation (s_n, s_{n-1}) = 12.3 to 12.7	B2	3	AWFW (12.358 or 12.679)
	If **neither** correct **but** working shown, then			$\sum x = 787$ $\sum x^2 = 34023$
	Mean $(\bar{x}) = \frac{\sum x}{20}$	(M1)		Used
(b)	Median = 42	B2		CAO
	Median = 41.5 or 39 or 40	(B1)		CAO
	Interquartile Range = 55 – 31 = 24	B2	4	CAO; allow B1 for identification of 31 and 55; B0 if method shown is incorrect
	Interquartile Range = 21 to 27	(B1)		AWFW
(c)(i)	**Mode:** eg Does not exist If exists, must be > 60 or 58 All / too many different values Sparse data	B1		OE
(ii)	**Range:** eg **Maximum value** is unknown / > 60 or 58	B1	2	OE; accept 'slowest' but not 'smallest'
		Total	**9**	

4(a)(i)	Mode = 2	B1		CAO
	Range = 15	B1	2	CAO
(ii)	CF: 4 17 41 58 73 84 89 95 x: 0 1 2 3 4 9 14 15			
	Median (48^{th}) = 3	B2		CAO; B0 if shown method is incorrect
	Interquartile Range ($72^{nd} - 24^{th}$) = 4 – 2 = 2	B2		CAO Allow B1 for identification of 4 and 2 B0 if shown method is incorrect
	If neither correct but CF attempted and matched correctly with ≥ 5 x–values	(M1) (A1)	4	Allow for median = $2 + \frac{x}{17}$
(iii)	Mean $(\bar{x})$ = 4.2	B2		CAO $\sum fx = 399$
	Standard Deviation $(s_n,\ s_{n-1})$ = 3.88 to 3.91	B2		$\sum fx^2 = 3111$ AWFW (3.887 or 3.907)
	If neither correct but mid-points of 7 and 12 seen	(B1)		
	and use of mean $(\bar{x}) = \frac{\sum fx}{95}$	(M1)	4	Allow for $4.1 \le \bar{x} \le 4.3$
(b)(i)	Unknown values (16) have no effect on median and IQR **or** median and IQR are exact values but $\bar{x}$ and s are estimates	B1	1	
(ii)	Use all available data or Enable further analyses	B1	1	
	Total		**12**	