| Question Number | Scheme | | Marks |
|---|---|---|---|
| **4.** (a) | $\bar{x} = 230.5$; 95% confidence limits for $\mu$ are | | |
| | $230.5 \pm 1.96 \times \frac{1.2}{\sqrt{5}}$ | their $\bar{x} \pm z \times \frac{1.2}{\sqrt{5}}$ | M1 |
| | | $z = 1.96$ | B1 |
| | $= (229.44815..., 231.55185...) = $ awrt $(229.4, 231.6)$ | At least one end-point is correct. | A1 |
| | | Both end-points are correct. | A1 |
| | | | **[4]** |
| (b) | { Let $X$ = number of confidence intervals that ***don't contain*** $\mu$ } | { Let $Y$ = number of confidence intervals that ***contain*** $\mu$ } | |
| | $\{$So $X \sim\}$ B$(20, 0.05)$ | $\{$So $Y \sim\}$ B$(20, 0.95)$ | M1 |
| | $\{P(X > 3)\} = 1 - P(X \leqslant 3)$ or $1 - 0.9841$ | $P(Y \leqslant 16)$ | A1 |
| | | awrt **<u>0.0159</u>** | A1 |
| | | | **[3]** |
| | | | **7** |

| | **Notes** | |
|---|---|---|
| **4.** (a) | **M1** | Allow $1.5 < \|z\| < 2$ (may be implied by one correct end point) |
| | **B1** | 1.96 or better |
| | **1st A1** | either awrt 229.4 **or** awrt 231.6 (allow 229.45) |
| | **2nd A1** | both awrt 229.4 **and** awrt 231.6 (allow 229.45) |
| (b) | **M1** | States or applies either $X \sim B(20, 0.05)$ or $Y \sim B(20, 0.95)$ |
| | **1st A1** | A correct probability statement for their distribution<br>$1 - P(X \leqslant 3)$ or $1 - 0.9841$ **<u>or</u>** $P(Y \leqslant 16)$. Can be implied by the final answer. |
| | **2nd A1** | awrt 0.0159 |