## Solutions

Marking: **K** knowledge, **App** use of the case or data, **An** analysis (a chain of reasons: cause, then effect), **Ev** evaluation (a judgement with a reason). In calculations, **M1** is for the method and **A1** for the answer; **B1** is an independent mark.

Each answer shows the steps, then the **result**.

**2.1**

$\frac{6}{6} = \mathbf{1}$

$\frac{6}{12} = \mathbf{0.5}$: four times the data halves the error

**2.2**

$SE = 1.175$

margin $2.131 \times 1.175 = 2.50$

[**26**.**2**, **31**.**2**] minutes

**2.3**

(a) wrong: the interval is about the mean, not single orders

(b) right

**2.4**

$\hat{p} = 0.30$; $SE = \sqrt{\frac{0.3 \times 0.7}{400}} = 0.0229$

margin $1.96 \times 0.0229 = 0.045$

[**0**.**255**, **0**.**345**]

**3.1**

(a) $\frac{5.0}{5} = \mathbf{1.0}$

(b) $31.2 \pm 2.064$: [**29**.**1**, **33**.**3**]

(c) no: the whole interval except a small part is above 30, and the best estimate is 31.2

(d) $\left(\frac{1.96 \times 5}{1}\right)^2 = 96.04$; $n = \mathbf{97}$

**3.2**

(a) $SE = \sqrt{\frac{0.46 \times 0.54}{200}} = 0.0352$; margin 0.069; [**39**.**1**%, **52**.**9**%]

(b) the interval includes values above 50%; the data cannot say whether a majority will or will not pay: a larger sample is needed

**3.3**

(a) $\hat{p} = 0.46$, $SE = 0.0407$; [**38**.**0**%, **54**.**0**%]



(b) $\left(\frac{1.96}{0.03}\right)^2 \times 0.46 \times 0.54 = 1{,}060.3$; $n = \mathbf{1{,}061}$

(c) **4**: the estimate 46% is above 40%, but the interval starts at 38%, just below (App); the pilot customers may not be random: volunteers sign up more (An); a larger test costs time but cuts the risk (An); judgement, e.g. launch in one area with a review at 3 months, or survey 1,061 first if a loss would be costly (Ev). **2**–**3**: interval used, weak judgement. **1**: one relevant point.



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