Solutions

Marking: **M1** a correct method, **A1** the correct answer, **B1** an independent mark.

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

2.1

Type I: rejecting H_0 when it is true; Type II: not rejecting H_0 when it is false

2.2

$H_0 : p = 0.5$, $H_1 : p > 0.5$; $P(X \geq 15) = 0.0207$; $0.0207 < 0.05$: reject H_0, evidence of bias towards heads (R1)

2.3

R^2 is the proportion of the variation in y explained by the model; the **exponential** model, because 0.94 is closer to 1 (R1)

3.1

(a) $H_0 : \mu = 500$; $H_1 : \mu < 500$

(b) $z = \dfrac{498.4 - 500}{4/\sqrt{25}} = \mathbf{-2.0}$

(c) $P(Z < -2.0) = \mathbf{0.0228}$

(d) $0.0228 < 0.05$: reject H_0; evidence that the machine under-fills (R1)

(e) **0.05**; the chance of deciding the machine under-fills when it is in fact correct (R1)

3.2

(a) $H_0 : m = 6$, $H_1 : m < 6$

(b) $P(X \leq 2 \mid m = 6) = \mathbf{0.0620}$

(c) $0.0620 > 0.05$: do not reject H_0 (R1); not enough evidence that the lights reduced accidents

(d) $P(X \leq 1) = 0.0174$, $P(X \leq 2) = 0.0620$; $\mathbf{X \leq 1}$

(e) Type II: $X \geq 2$ when $m = 3$; $1 - P(X \leq 1 \mid m = 3) = \mathbf{0.801}$