Solutions

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

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

2.1

city $27/30 = \mathbf{0.90}$

rural $9/12 = \mathbf{0.75}$

2.2

selection: city $39/200 = \mathbf{0.195}$; rural $13/100 = \mathbf{0.13}$

precision: city $27/39 \approx 0.69$; rural $9/13 \approx 0.69$

flags are equally reliable, but fewer rural students are flagged and more real rural cases are missed

2.3

postcode: linked to income

phone type: linked to income

absences may also reflect family duties or health, so they need a careful look

2.4

flagged students are checked more, so more of their problems are recorded

the next model learns that these groups have more problems, and flags them even more

3.1

(a) city $12/170 \approx \mathbf{0.071}$; rural $4/88 \approx \mathbf{0.045}$

(b) equal opportunity: recall 0.90 against 0.75; a rural student who needs help is more likely to be missed

(c) the groups have different base rates, 15% and 12%; with an imperfect model, equalising some of these rates forces the others apart

(d) a lower threshold for rural students, or more rural training data and features that matter for them

3.2

(a) it predicts likely text from patterns, not checked facts; its confidence comes from fluent wording, not from knowing it is right

(b) show sources or worked steps that students can check, and say clearly that it can be wrong; teach students to verify, and let teachers review common answers

(c) not on its own: errors would affect grades, so a teacher must check and decide

3.3

(a) students and parents: fair access to help and privacy; teachers and the school: helping the students who need it most, with limited places

(b) rural students are missed more often, so they lose places; the model has no knowledge of recent events, such as illness at home, that a teacher knows

(c) compare recall and selection rate by group each term, and act if the gap is over an agreed limit, e.g. 5 points

(d) use the model to make a long list for teachers, who choose the 30 with what they know; tell families how places are chosen, allow appeals, and review the results each term

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