Solutions

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

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

2.1

Rain ⇒ Closed

Match ⇒ (¬Closed ∧ Referee)

Cancelled ⇒ Email

2.2

TT: T; TF: F

FT: T; FF: T

2.3

HeavyTraffic by R1

Delayed by R2

RefundRisk by R3; R4 never fires

2.4

$2^{20} \approx \mathbf{10^{6}}$

$2^{50} \approx \mathbf{10^{15}}$: too many to check

3.1

(a) goal RefundRisk: R3 needs Delayed; Delayed: R2 needs HeavyTraffic and Weekend (R4 needs Holiday, not known); HeavyTraffic from R1 and Storm; Weekend is a fact: proved

(b) R4: Holiday is not a fact, and no rule concludes it

(c) when there is one question to answer and many rules, most of them unrelated

(d) modus ponens is sound: in every situation where P and $P \Rightarrow Q$ are true, Q is true

3.2

(a) the negated goal: ¬Delayed

(b) ¬Delayed with $(\neg H \vee \neg W \vee D)$ gives $(\neg H \vee \neg W)$; with Weekend gives $\neg H$; with $(\neg S \vee H)$ gives $\neg S$; with Storm gives the empty clause, so Delayed is proved

3.3

(a) each advice can be explained by the rules that fired; teachers can read and change the rules

(b) the rule base does not cover every case; the helper has no answer, or gives no warning that it has none

(c) detect the conflict, and show both rules with their reasons; a teacher decides, and the rules are fixed afterwards

(d) use it as advice with explanations, and always end with a conversation with a teacher; log cases where no rule fires and add rules for them each term

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