## COMPUTER SCIENCE TRIPOS Part IB – 2025 – Paper 6

## 7 Logic and Proof (mj201)

(a) Present either a proof in tableaux or a falsifying interpretation for:

$$\forall x (P(x) \to Q(x)) \to (\forall y P(y) \to \forall z Q(z))$$

[11 marks]

(b) Convert the following formulae (where a and b are constants, and x, y and z are variables) into clauses, and exhibit a model or show that none exists using resolution.

$$P(x,x) \rightarrow R(a,x)$$
 (i)

$$P(x,y) \wedge P(y,x) \rightarrow Q(x)$$
 (ii)

$$Q(y) \rightarrow \neg Q(a)$$
 (iii)

$$R(b,y) \rightarrow P(y,y)$$
 (iv)

$$\neg R(x,y) \rightarrow R(z,a)$$
 (v)

[9 marks]