

**CM20019—COMPUTATION III:
FORMAL LOGIC AND SEMANTICS
EXERCISE SHEET 10, 4.12.2007**

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Problem 1. Consider the formula

$$\left((p \wedge q) \vee (r \wedge s) \right) \rightarrow \left((p \vee r) \wedge (q \vee s) \right) .$$

Prove its validity by using the resolution method.

Problem 2. Consider the formula

$$(\exists X)(\forall Y) \left(\left((p(X) \rightarrow p(Y)) \rightarrow p(X) \right) \rightarrow p(X) \right) .$$

Prove its validity by using the resolution method.

Problem 3. Consider the formula

$$(\forall X)(\exists Y) \left(p(X) \wedge (q(X) \vee r(Y)) \right) \rightarrow (\forall X) \left((p(X) \wedge q(X)) \vee (\exists Y)(p(X) \wedge r(Y)) \right) .$$

Prove its validity by using the resolution method.

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The web page for the course is at [1]. You can find other exercises in Dan Richardson's notes, available from the web page.

References

1. Alessio Guglielmi, *CM20019—Computation III: Formal logic and semantics*, <http://cs.bath.ac.uk/ag/CM20019>, 2007.