

MATH 150 PRACTICE PROBLEMS 1

Problem 1. Determine if the following are tautologies:

(a) $(R \rightarrow (S \vee Q))(R \vee (S \rightarrow Q))$

(b) $(R \leftrightarrow P) \vee (P \rightarrow \neg R)$

Problem 2. Do Section 1.5/Exercise 1

Problem 3. Prove or refute the following.

(a) If $\Sigma \Vdash (\alpha \wedge \beta)$, then $\Sigma \Vdash \alpha$ and $\Sigma \Vdash \beta$.

(b) If $\Sigma \Vdash (\alpha \vee \beta)$, then $\Sigma \Vdash \alpha$ or $\Sigma \Vdash \beta$.

Problem 4. Show that $\{\wedge, \leftrightarrow, +\}$ is complete, but $\{\wedge, +\}$ is not complete. Here $\alpha + \beta$ means $(\alpha \vee \beta) \wedge \neg(\alpha \wedge \beta)$.

Problem 5. Show that $\{\perp, \rightarrow\}$ is complete, but $\{\wedge, \rightarrow\}$ is not complete.

Problem 6. Show that $\{\rightarrow, +\}$ is complete, but $\{\leftrightarrow, +\}$ is not complete.