MTH-684 Logic
Assignment (4): Reasoning in Propositional Logic

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Prove that:

$$\{(A \implies B), ((B \vee C) \implies D), (E \wedge \neg D)\} \vdash (A \implies E)$$

Proof.

1.$(A \implies B)$	(Hypothesis)
2.$((B \vee C) \implies D)$	(Hypothesis)
3.$(E \wedge \neg D)$	(Hypothesis)
4.$\neg D$	(3, SIM)
5.$\neg(B \vee C)$	(2, 4, MT)
6.$(\neg A \vee B)$	(1, IMP1)
7.$((\neg A \vee B) \vee C)$	(6, AD)
8.$(\neg A \vee (B \vee C))$	(7, GR)
9.$(A \implies (B \vee C))$	(8, IMP2)
10.$\neg A$	(5, 9, MT)
11.$(\neg A \vee E)$	(10, AD)
12.$(A \implies E)$	(11, IMP2)

□