Discrete Math - Clex 2 - Solutions

①

p	q	r	q→r	p∨~q	p→(q→r)	(p∨~q)∧q	q→r
T	T	T	T	T	T	T	T
T	T	F	F	T	F	T	F
T	F	T	T	T	T	F	T
T	F	F	T	T	T	F	F
F	T	T	T	F	T	F	T
F	T	F	F	F	T	F	T
F	F	T	T	T	T	F	T
F	F	F	T	T	T	F	T

This is a valid argument.

② Equivalently we will prove the validity of

$$p \to q, \ p \to (q \to r), \ p \vdash r$$

$$\frac{P, \ p \to q}{q} \ MP \qquad \frac{P, \ p \to (q \to r)}{q \to r} \ MP$$

$$\frac{}{r} \ MP$$

③

$$\frac{\sim(p \wedge q)}{\sim p \vee \sim q}$$
$$\frac{}{p \to \sim q}$$

$$\frac{\sim(\sim r \wedge p)}{r \vee \sim p}$$
$$\frac{}{\sim r \to \sim p}$$

$$\frac{\sim(r \wedge \sim q)}{\sim r \vee q}$$
$$\frac{}{\sim q \to \sim r} \ \text{Hyp. Syll.}$$

$$\frac{}{\sim q \to \sim p} \ \text{Hyp Syll}$$

$$\frac{p \to \sim p}{\sim p \vee \sim p}$$
$$\frac{}{\sim p}$$

④

$$F \to C \quad \frac{L \wedge \sim C}{\sim C}$$
$$\frac{}{\sim F} \ MT$$

$$\frac{B \wedge L \to F}{\sim(B \wedge L)} \ MT$$
$$\frac{\sim B \vee \sim L}{L \to \sim B}$$

$$\frac{L \wedge \sim C}{L} \ MP$$

$$\frac{}{\sim B}$$

The argument is:
$$B \wedge L \to F, \ F \to C, \ L \wedge \sim C \vdash \sim B$$