CSCA 67.

1 a).

p	q	r	$p \leftrightarrow q$	$(p \leftrightarrow q) \rightarrow r$
T	T	T	T	F
T	T	F	T	T
T	F	T	F	F
T	F	F	F	F
F	T	T	F	F
F	T	F	F	F
F	F	T	T	F
F	F	F	T	T

b). $(\neg p \wedge q) \vee (\neg q \wedge p) \vee r$.

c) using the $\rightarrow$ law, DeMorgan's law & the Biconditional law.

d) $(p \leftrightarrow q) \rightarrow r$.

↳ $(p \rightarrow q) \wedge (q \rightarrow p) \rightarrow r$ — Biconditional.

↳ $(\neg p \vee q) \wedge (\neg q \vee p) \rightarrow r$ — $\rightarrow$ law.

↳ $\neg((\neg p \vee q) \wedge (\neg q \vee p)) \vee r$ — $\rightarrow$ law

↳ $\neg(\neg p \vee q) \vee \neg(\neg q \vee p) \vee r$ — DeMorgan's law.

↳ $(p \wedge \neg q) \vee (q \wedge \neg p) \vee r$.

↳ $(\neg p \wedge q) \vee (\neg q \wedge p) \vee r$.

2. (a) 1 2 3 4 6
(b) 1 2 3 4 6 7 8
(c) 2, 6 4. 8
(d) 6. 2. 4. 8.
(e) 1 2 3 4 7 8 + 6.

3. → means that only true when p is True, q is False.

⇔ means the common parts for both (both true or both false).

4. left side $\neg r \to \neg(p \vee q)$

$\hookrightarrow r \vee \neg(p \vee q)$

$\hookrightarrow \neg(p \vee q) \vee r.$

right side $(p \to q) \to r.$

$\hookrightarrow \neg(p \to q) \vee r.$

as $(p \vee q)$ is not equal to $(p \to q)$,
left side is not equal the right side.
The statement is disapproved.

To disaprove an equivalance without providing the entire truth table, you need to show that they're diffrent at the same place.