Question 2.

Use the drop-down menus to select a correct statement.

p	q	r
T	T	F
T	F	T
F	T	F
F	F	F

Check every combo:
$r \Leftrightarrow (p \to q)$ (wrong).
$\sim r \Leftrightarrow (p \to q)$ (true).

The converse of the right-hand side of the above statement is equivalent to:
p ✓ v ✓ ~q ✓

p	q	r
T	T	T
T	F	F
F	T	T
F	F	T

$r \Leftrightarrow p \to q$
$T \Leftrightarrow T \to T$
$F \Leftrightarrow T \to F$
$T \Leftrightarrow F \to T$
$T \Leftrightarrow F \to F$

By logical equivalence:
$p \to q$ converse is
$q \to p \Rightarrow p \vee \sim q$.

Must check every perm.

p	q	r
T	T	T
T	F	F
F	T	F
F	F	F

Check $r \Leftrightarrow p \to q$
$T \Leftrightarrow T \to T$
$F \Leftrightarrow T \to F$
$F \Leftrightarrow F \to T$ ×
$F \Leftrightarrow F \to F$

$\sim r \Leftrightarrow p \to q$
$F \Leftrightarrow T \to T$ ×

$r \Leftrightarrow \sim p \to q$
$T \Leftrightarrow F \to T$
$F \Leftrightarrow F \to F$ ×

$r \Leftrightarrow \sim p \to \sim q$
$T \Leftrightarrow F \to F$
$F \Leftrightarrow F \to T$ ×

$\sim r \Rightarrow p \to \sim q$
$F \Rightarrow F \to F$ ×

$\sim r \Leftrightarrow p \to \sim q$
$F \Leftrightarrow T \to F$
$T \Leftrightarrow T \to T$
$T \Leftrightarrow T \to T$
$F \Leftrightarrow F \to T$ ✓

$\sim r \Leftrightarrow p \to \sim q$

b) The negation of the right-hand side of the above statement is equivalent to:

$\sim(p \to \sim q)$

Note: $\sim(a \to b) = a \wedge \sim b$.

$\Rightarrow p \wedge q$.

a)

p	q	r
T	T	F
T	F	F
F	T	F
F	F	T

$r \Leftrightarrow p \to q$ ×
$\sim r \Leftrightarrow p \to q$ ×
$r \Leftrightarrow \sim p \to q$ ×
$r \Leftrightarrow \sim p \to \sim q$ ×

$\sim r \Leftrightarrow \sim p \to \sim q$ ×
$\sim r \Leftrightarrow \sim p \to q$

b) The negation of the right-hand side of the above statement is equivalent to:

$\sim(\sim p \to q) \Rightarrow \sim p \wedge \sim q$