1 Determine whether the argument is valid:

$$\begin{array}{c} p \leftrightarrow q \\ q \rightarrow r \\ \hline \vdots \quad \neg r \rightarrow \neg p \end{array}$$

The argument is VALID:

p	q	r	$[(p \leftrightarrow q)]$	\land	$(q \rightarrow r)]$	\rightarrow	$ (\neg r \to \neg p) \rangle$
1	1	1	1	1	1	1	1
1	1	0	1	0	0	1	0
1	0	1	0	0	1	1	1
1	0	0	0	0	1	1	0
0	1	1	0	0	1	1	1
0	1	0	0	0	0	1	1
0	0	1	1	1	1	1	1
0	0	0	1	1	1	1	1

2 Translate the arguments into symbolic form, then determine the validity of the argument: "If the truck is a diesel, then the truck is too cold to start. The truck is too cold to start or the truck has a flat tire. Therefore the truck is not a diesel."

Let

p: The truck is a diesel
q: The truck is too cold to start
r: The truck has a flat tire,

so the argument becomes

$$\begin{array}{c} p \to q \\ q \lor r \\ \hline \therefore \neg p \end{array}$$

The argument is INVALID:

p	q	r	$\left[(p \to q) \right]$	\wedge	$(q \lor r)]$	\rightarrow	$ \neg p$
1	1	1	1	1	1	0	0
1	1	0	1	1	1	0	0
1	0	1	0	0	1	1	0
1	0	0	0	0	0	1	0
0	1	1	1	1	1	1	1
0	1	0	1	1	1	1	1
0	0	1	1	1	1	1	1
0	0	0	1	0	0	1	1

3 Determine the validity of the argument using an Euler diagram:

Some caterpillars are furry.

All furry things are mammals.

 \therefore Some caterpillars are mammals.

The argument is VALID:

