Question 3 (a) Let $n \in \{1.2, 3, 4.5, 6, 7.8, 9\}$ and let p, q be the following propositions concerning the integer n.

$$p\text{: } n \text{ is even;} \qquad q\text{: } n < 5.$$

Find the values of n for which each of the following compound statements is true.

(i) $\neg p$; (ii) $p \wedge q$: (iii) $\neg p \vee q$: (iv) $p \ominus q$.

[4]

(b) (i) Let p, q be propositions. Construct the truth table for $p \to q$. [2]

(ii) Use truth tables to prove that $\neg q \to \neg p = p \to q$. [2]

(iii) Write the contrapositive of the statement:

If $n = 23$, then n is prime.

[2]