Exercise 7.3

3) Given,
$AB = PQ$,
$BC = QR$ and
$AM = PN$

i. $\frac{1}{2} BC = BM$ and $\frac{1}{2} QR = QN$
Also, $BC = QR$
So, $\frac{1}{2} BC = \frac{1}{2} QR$
$\Rightarrow BM = QN$
In $\triangle ABM$ and $\triangle PQN$,
$AM = PN$ and $AB = PQ$
$BM = QN$
$\therefore \triangle ABM \cong \triangle PQN$ by SSS congruency

ii. In $\triangle ABC$ and $\triangle PQR$
$AB = PQ$ and $BC = QR$
$\angle ABC = \angle PQR$ (by CPCT)
So, $\triangle ABC \cong \triangle PQR$ by SAS congruency

4) It is known that BE and CF are two equal altitudes.
Now, in $\triangle BEC$ and $\triangle CFB$,
$\angle BEC = CFB = 90^\circ$
$BC = CB$
$BE = CF$

So, $\triangle BEC \cong \triangle CFB$ by RHS

Also, $C = B$

Therefore, $AB = AC$ as side opposite to equal angles is always equal.

5) In the question, it is given that $AB = AC$

Now, $\triangle APB$ and $\triangle APC$ are similar by RHS

$\angle APB = \angle APC = 90°$

$AB = AC$

$AP = AP$

So, $\triangle APB \cong \triangle APC$

$\therefore B = C$ by CPCT