

(1) If you miss the mid-term test, then you fail the course. <sup>①</sup>

Let  $p =$  You miss the mid-term test

$q =$  You pass the course. (1 mark)

$\sim q =$  You fail the course

$\sim p =$  You do not miss the mid term test

(i)  $p \rightarrow \bar{q}$  : If you miss the mid-term test, then you fail the course (1 mark)

(ii) If you do not miss the mid-term test, then you pass the course  $\Rightarrow \bar{p} \rightarrow q$ . ( $\frac{1}{2}$  mark)

To Prove whether  $p \rightarrow \bar{q} \equiv \bar{p} \rightarrow q$ .

Using truth table, if both results in tautology, then they are equivalent, otherwise, they are not.

$p$	$q$	$\bar{p}$	$\bar{q}$	$p \rightarrow \bar{q}$	$\bar{p} \rightarrow q$	$\frac{p \rightarrow \bar{q}}{\bar{p} \rightarrow q}$
T	T	F	F	F	T	F
T	F	F	T	T	T	T
F	T	T	F	T	F	F
F	F	T	T	T	T	T

(2 marks)

This indicates that it is not a tautology,

Thus, the two propositions are not equivalent.

$p$	$q$	$\sim p$	$\sim p \wedge q$	$\bar{A} \rightarrow \bar{B} \equiv \bar{A} \wedge \bar{B}$	$\bar{A} \wedge \bar{B}$	$\bar{A} \wedge \bar{B} \equiv \bar{A} \wedge \bar{B}$
T	T	F	F	T	F	F
T	F	F	F	T	T	T
F	T	T	T	F	F	T
F	F	T	F	F	T	F

(2 1/2 marks)

Does not results in tautology

Thus, they are not equivalent