Question 10 (Unit 5) – 15 marks

(i) Parts (a), (b) and (c) below are concerned with the following (contorted but correct) formal proof.

	(1)	$-(\theta \,\&\, -\psi)$	Ass
	(2)	$(-\psi \to -\theta)$	Taut, (1)
	(3)	$(-\phi \vee \theta)$	Ass
	(4)	$(-(\theta \,\&\, -\psi) \to (-\psi \to -\theta))$	CP, (2)
	(5)	$((-\phi \vee \theta) \to (\theta \to \psi))$	Ass
	(6)	$(\phi \to \psi)$	Taut, (2), (3)
	(7)	$((-\phi \vee \theta) \to (\phi \to \psi))$	Taut, (5)
	(8)	$((-\phi \vee \theta) \to (\phi \to \psi))$	CP, (6)

(a) The assumption numbers are missing from the above proof. Write down what they should be for each line of the proof. [4]

(b) State which formulas have been used where the Tautology Rule has been applied (on lines (2), (6) and (7)). [3]

(c) Show that the formula in your answer to part (b) which is used to obtain line (6) is indeed a tautology. [2]

(b) Write down a formal proof of the formula

$$((-\phi \longleftrightarrow \psi) \to (\phi \to -\psi))$$

depending on no assumptions. State which tautologies you have used whenever the Tautology Rule as been applied in your proof. [6]
