

CS1231S Assignment #1

AY2025/26 Semester 1

Deadline: Monday, 15 September 2025, 1:00pm

TEMPLATE FOR SUBMISSION

Q0. Full name: _____

Tutorial grp.: _____

Q1. Propositional logic (Total: 8 marks)

(a)(i)

[2 marks]

p	q	r	$q \wedge r$	$p \rightarrow q$	$p \rightarrow r$	$p \rightarrow (q \wedge r)$	$(p \rightarrow q) \wedge (p \rightarrow r)$
T	T	T					
T	T	F					
T	F	T					
T	F	F					
F	T	T					
F	T	F					
F	F	T					
F	F	F					

(a)(ii)

[2 marks]

p	q	r	$q \vee p$	$r \vee p$	$r \vee \sim q$	$(q \vee p) \wedge (r \vee p)$	$(q \vee p) \wedge (r \vee \sim q)$	$(q \vee p) \wedge (r \vee \sim q)$
T	T	T						
T	T	F						
T	F	T						
T	F	F						
F	T	T						
F	T	F						
F	F	T						
F	F	F						

(b). (If you use fewer than 10 steps, you can leave the later steps blank.)

[4 marks]

$$\sim((p \rightarrow q) \wedge (q \rightarrow r))$$

Step 1. $\equiv$

Step 2. $\equiv$

Step 3. $\equiv$

Step 4. $\equiv$

Step 5. $\equiv$

Step 6. $\equiv$

Step 7. $\equiv$

Step 8. $\equiv$

Step 9. $\equiv$

Step 10. $\equiv$

Q2. Argument (Total: 5 marks)

The given argument is

Proof:

Q3. Sets (Total: 5 marks)

(a) [1 mark]

$X =$

$Y =$

(b) [1 mark]

$S =$

(c) [1 mark]

Cardinality of $A_k \cap A_{\{k+1\}}$:

(d) [2 marks]

Cardinality of $B_k \setminus B_m$:

Q4. Predicate Logic (Total: 8 marks)

(a) [2 marks]

(b) [2 marks]

(c) [2 marks]

(d) [2 marks]

Q5. Proof (6 marks)

$$\forall a, b, c \in \mathbb{Z} \ (a^2 + b^2 = c^2) \rightarrow (Even(a) \vee Even(b))$$

1. Let a, b and c be any three integers.
2. Assume both a and b are odd integers such that $a^2 + b^2 = c^2$.

Q6. Proof on Sets (6 marks)

Prove for any non-empty sets A and B : $A \subseteq B \leftrightarrow \mathcal{P}(A) \subseteq \mathcal{P}(B)$.