

Assignment 5 Rubrics (100 points max, 110 points in total)

Q1 (15 points)

- (a) (d) only correct answer(**3 points**), one more incorrect answer(**1 point**), otherwise(**0 points**)
- (b) (c) (e) each correct answer(**1 point**), each incorrect answer(**minus 1 point**)

Q2 (15 points)

1. conclusion for 1 pt, counter example/explanation for 4 pts
2. conclusion for 1 pt, explanation for 4 pts
3. conclusion for 1 pt, counter example/explanation for 4 pts

Q3 (10 points)

1. explanation integrity for 5 pts
2. explanation integrity for 5 pts

Q4 (10 points)

- (a) $P(n)$ denote the statement " R_n is symmetric" 1p $P(1)$, $P(2)$ is true 2p the right inductive process 4p
- (b) $R^* =$ the union of all R_n from 1 to the infinity 1p prove by definition 2p

Q5 (5 points)

- **Illustrative Examples (2 points)**: Merely demonstrating correctness through examples without providing a complete proof process warrants 2 points.
- **Comprehensive Proof (5 points)**: A complete and thorough proof is required for earning the full 5 points.
 - Note **Deductions (1-3 points at discretion)**: Points may be deducted, ranging from 1 to 3, if essential steps are lacking in the presented proof.

Q6 (10 points)

the final result is all 1 on W5, give 10'

if error and have great solution step give 5'

Q7 (10 points)

- (a) Reflexive Symmetric Transitive 2' per step get all three give 7'
- (b) $[1] = \mathbb{Z}$, $[1\ 2] = \{1\ 2 + n \mid n \in \mathbb{Z}\}$, and $[\pi] = \{\pi + n \mid n \in \mathbb{Z}\}$ 1' per result

Q8 (10 points)

- (a) 7'

- Reflexive:
 - For all $x \in R$, $f(x) \leq f(x)$, so $f \leq f$. 2'
- Antisymmetric:
 - If $f \leq g$ and $g \leq f$, then for all $x \in R$ we have $f(x) \leq g(x) \leq f(x)$ 1'
 - $f(x) = g(x)$, i.e., $f = g$ 1'
 - **Antisymmetric Relation: A relation R on a set A is called antisymmetric if $(b, a) \in R$, $(a, b) \in R$ implies $a = b$ for all $a, b \in A$.**
- Transitive:
 - If $f \leq g$ and $g \leq h$, then for all $x \in R$ we have $f(x) \leq g(x) \leq h(x)$ 2'
 - $f(x) \leq h(x)$, i.e., $f \leq h$ 1'

(b) 3'

- Counterexample 2'
- It is not the case that for all x , $f(x) \leq g(x)$, and it is not the case that for all x , $g(x) \leq f(x)$. (Other explanation like this can also get the point) **OR** these two functions are not comparable. 1'

There are some students haven't understand the question or the concept of total ordering, try asking SAs or teachers or other students.

Q9 (20 points)

- (a) For each wrong selection: -1
- (b) The same as above

Q10 (5 points)

$\{2, 3, 4, 6, 12\}$, $\{2, 3, 6, 4, 12\}$, $\{2, 4, 3, 6, 12\}$, $\{3, 2, 4, 6, 12\}$, $\{3, 2, 6, 4, 12\}$.

For each answer: +1

For each wrong answer: -1

Besides, for some not normal answer, it depends on the assistant.