Discrete Structures Z2

Assignment 2.

1.3.

To prove the preorder $R=(A,\leq)$ ~~or~~ with.
let $x \equiv y$ iff $x \leq y$ and $y \leq x$ is equivalence relation. we need to prove

$R = \begin{cases} (A, \leq) \\ \text{~~let~~ } x \equiv y \text{ iff } x \leq y \text{ and } y \leq x \end{cases}$ is reflexive, symmetric and transitive.

Prove:

since $(A, \leq)$ is a preorder. based on the definition of preorder. $(A, \leq)$ is reflexive and transitive.

Then for each $(x, y) \in R$

it has $x \equiv y$ then. ~~x~~ $y \leq x$ satisfies.

so $(y, x) \in R$.

$\therefore$ R is transitive.

So. R is equivalence relation.

To prove $(A, \leq)$ preorder is a partial order. we need to prove $(A, \leq)$ is antisymmetric

Prove.

for each $(x, y), (y, x) \in R$, $x \leq y$ and $y \leq x$. we can conclude that $x \equiv y$ based on. the condition $x \equiv y$ iff $x \leq y$ and. $y \leq x$.

so $(A, \leq)$ is antisymmetric

thus preorder $(A, \leq)$ is a partial order.