CANDIDATE

z5496297

TEST

Quiz 4

Subject code	--
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Question	Status	Marks	Question type
1.1	Correct	1/1	Multiple Response
1.2	Correct	1/1	Multiple Choice
1.3	Correct	1/1	Multiple Choice
1.4	Correct	1/1	True / False
1.5	Correct	1/1	True / False
2.1	Correct	1/1	Multiple Response
2.2	Correct	1/1	Multiple Response
2.3	Correct	1/1	Multiple Response
2.4	Correct	1/1	Multiple Response
2.5	Wrong	0.029999999329447746/1	Text Entry

1.1 Consider the relation

$R = \{(m, n) \in \mathbb{Z} \times \mathbb{Z} \; : \; m^2 =_{(5)} n^2\}$

Which of the following properties does R satisfy?

Select all that apply

- [x] Reflexivity (R) ✓
- [ ] Antireflexivity (AR)
- [x] Transitivity (T) ✓
- [x] Symmetry (S) ✓
- [ ] Antisymmetry (AS)

1.2 Let Σ = {a,b,c} and define a binary relation R on Σ* as follows:

(w,v) ∈ R if and only if length(w) = length(v).

Which of the following is true?

- R is neither an equivalence relation nor a partial order
- R is both an equivalence relation and a partial order
- R is a partial order and not an equivalence relation
- R is an equivalence relation and not a partial order ✔

1.3 Consider the poset $(\{1, 3, 5, 9, 15, 45\}, |)$.
What is glb(15,9)?

- 1
- 3 ✔
- 5
- 9
- 15
- 45
- Doesn't exist

1.4 True or false:
For all relations R, if R is symmetric, then $R = R^{\leftarrow}$

- [ ] False
- [x] True

1.5 True or false:
For all relations R, if R is transitive and antisymmetric, then R is reflexive

- [x] False
- [ ] True

2.1 Let $\Sigma = \{0,1\}$ and consider the relation on Σ^* given by $R = \{(w,v) : \text{length}(w) \geq 2\cdot\text{length}(v)\}$
Which of the following properties does R satisfy?
Select all that apply:

- [ ] Reflexivity (R)
- [x] Antisymmetry (AS)
- [x] Transitivity (T)
- [ ] Symmetry (S)
- [ ] Antireflexivity (AR)

2.2 Which of the following relations (over ℕ) are also functions?
Select all that apply:

- [x] The relation {(n-1, n) : n ∈ ℕ>0} ✓
- [ ] The relation {}
- [ ] The relation {(n, m, n+m) : n,m ∈ ℕ}
- [ ] The | relation
- [ ] The ≤ relation
- [x] The = relation ✓

2.3 Let $F = \mathbb{N}^{\mathbb{N}}$ denote the set of functions from ℕ to ℕ. Define the relation R on F×F as follows:
$(f, g) \in R$ **if** $f(n) \neq g(n)$ **for only finitely many** $n \in \mathbb{N}$
Which of the following properties does R satisfy?
Select all that apply:

- [ ] Antisymmetry (AS)
- [x] Transitivity (T) ✓
- [x] Symmetry (S) ✓
- [ ] Antireflexivity (AR)
- [x] Reflexivity (R) ✓

2.4 Let $F = \mathbb{N}^{\mathbb{N}}$ denote the set of functions from ℕ to ℕ. Define the relation R on F×F as follows:
$(f, g) \in R$ if $f(n) \leq g(n)$ for infinitely many $n \in \mathbb{N}$
Which of the following properties does R satisfy?
Select all that apply:

- [ ] Transitivity (T)
- [x] Reflexivity (R) ✔
- [ ] Antireflexivity (AR)
- [ ] Symmetry (S)
- [ ] Antisymmetry (AS)

2.5 Let Σ = {0,1} and define f:Σ*×Σ*→Σ* and g,h,k:Σ*→Σ* as follows:

- f(v,u) = uv for all v,u ∈ Σ*
- g(w) = f(01,w)
- h(w) = f(10,w)
- k = g∘h

What is g(110)? 01110 ✖ (11001)

What is h(110)? 10110 ✖ (11010)

What is k(110)? 0110110 ✖ (1101001)