

Worksheet 7
RELATIONS: PARTIAL ORDERS, ETC.
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Exercise 14.1 : Let the universe be $U = \mathbb{R} \times \mathbb{R}$. Let the sets $A = \mathbb{N}_3$, $B = \mathbb{Z}_4^*$, $C = \mathbb{N}_3^*$, and $D = \mathbb{N}_5$.

14.1.1: Let $P \subseteq U \ni P = \{(a, b) : b \leq a\}$

Let $R \subseteq B \times B \ni R = \{(b, c) : c > b\}$

Let $S \subseteq C \times C \ni S = \{(c, d) : c = d \vee c = 2 \cdot d\}$

Show it is the case that P is a partial order on A ; or, provide justification why it is not the case.¹

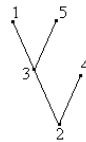
Show it is the case that R is a partial order on B ; or, provide justification why it is not the case.

Show it is the case that S is a partial order on C ; or, provide justification why it is not the case.

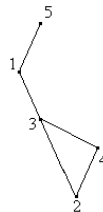
14.1.2: Let $M \subseteq C^2 \ni P = \{(0, 0), (1, 1), (2, 2), (3, 3), (1, 0), (1, 2), (2, 0)\}$

Show it is the case that M is a partial order on B ; or, provide justification why it is not the case.

14.2.1: Consider $D \times D$ and the following Hasse Diagramme symbolise a partial order on D , call it P_1 . Find P_1 in set notation (list of the elements).



14.2.2: Consider $D \times D$ and the following Hasse Diagramme symbolise partial order on D , call it P_2 . Find P_2 in set notation (list of the elements).

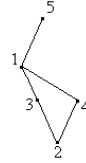


¹If you have trouble with this - find some elements of P (that might help).

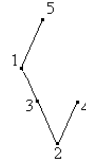
14.2.3: Consider $D \times D$ and the following Hasse Diagramme symbolise partial order on D , call it P_3 . Find P_3 in set notation (list of the elements).



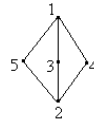
14.2.4: Consider $D \times D$ and the following Hasse Diagramme symbolise partial order on D , call it P_4 . Find P_4 in set notation (list of the elements).



14.2.5: Consider $D \times D$ and the following Hasse Diagramme symbolise partial order on D , call it P_5 . Find P_5 in set notation (list of the elements).



14.2.6: Consider $D \times D$ and the following Hasse Diagramme symbolise partial order on D , call it P_6 . Find P_6 in set notation (list of the elements).



Rest of assignment:

Do the exercises on handout 13 - problems 2, 4, and 5 - 10 (all).