

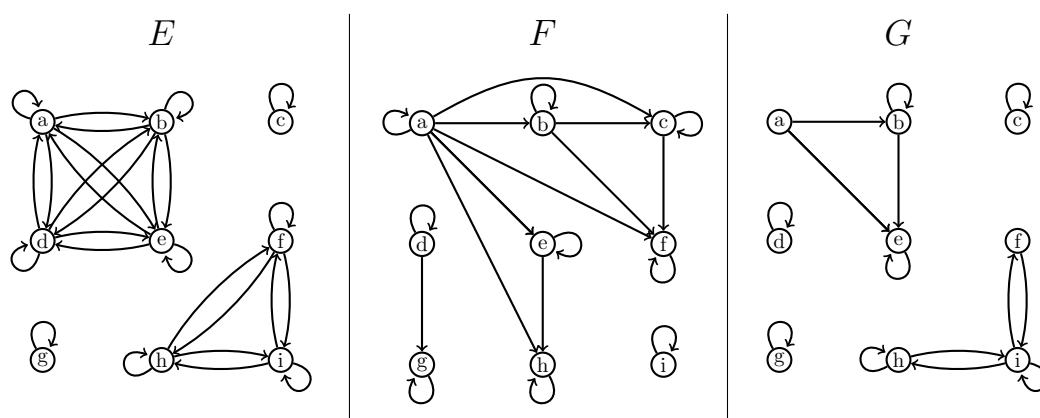
MAT1830 - Discrete Mathematics for Computer Science

Assignment #6

To be handed in at the beginning of your support class in week 8 (24 – 28 April)

If you're missing out on your usual support class on Tue 25 Apr, you can submit your assignment under the door of Daniel's office (9Rnf/418) by 2:30pm Fri 28 Apr. Please clearly mark your support class day, time and room on your assignment.

- For each of the binary relations E , F and G on the set $\{a, b, c, d, e, f, g, h, i\}$ pictured below, state whether the relation is reflexive, symmetric, antisymmetric and transitive. When a relation does not have one of these properties give an example of why not.



- For those (if any) of E , F and G that are equivalence relations, state the equivalence classes. Answer only required.
- For those (if any) of E , F and G that are partial order relations, are they total order relations? Fully justify your answer.
- Let R be binary relation defined on $\mathcal{P}(\mathbb{N})$ by ARB if and only if $|A \cap B| \leq 2$. Is R reflexive? Is it symmetric? Is it antisymmetric? Is it transitive? Fully justify each of your answers.
- Let S be equivalence relation defined on $\{x : x \in \mathbb{R} \text{ and } 0 \leq x \leq 5\}$ defined by xSy if and only if $\lceil x \rceil = \lceil y \rceil$. What are the equivalence classes of S ? Answer only required.
Note: $\lceil q \rceil$ is defined to be the smallest integer greater than or equal to q . You can think of it as “ q rounded up”. You don't need to prove that S is an equivalence relation.
- Let T be the partial order relation defined on $\mathbb{N} \times \mathbb{N}$ by $(a, b)T(c, d)$ if and only if $a \leq c$ and $b \leq d$. Is T a total order relation? Fully justify your answer.
Note: You don't need to prove that T is a partial order relation.