Name:

NetID: **Lecture:**   **B**

Discussion: **Friday**   **11**   **12**   **1**   **2**   **3**   **4**

1. (5 points)   Check all boxes that correctly characterize this relation on the set $\{A, B, C, D, E, F\}$.

Reflexive: $\boxed{\checkmark}$ Irreflexive: $\square$

Symmetric: $\square$ Antisymmetric: $\square$

Transitive: $\boxed{\checkmark}$

2. (5 points)   Let R be the equivalence relation on the real numbers such that xRy if and only if $\lfloor x \rfloor = \lfloor y \rfloor$. Give three members of the equivalence class $[13]$.

   Solution: 13, 13.1, 13.7

3. (5 points) Let T be the relation defined on set of pairs $(x, y) \in \mathbb{R}^2$ such that $(x, y)T(p, q)$ if and only if $x \leq p$ or $y \leq q$. Is T transitive? Informally explain why it is, or give a concrete counter-example showing that it is not.

   Solution: This relation is not transitive. We have $(0, 0)T(-10, 10)$ (look at the second coordinate). We also have $(-10, 10)T(-5, -5)$ (look at the first coordinate). But it's not the case that $(0, 0)T(-5, -5)$.

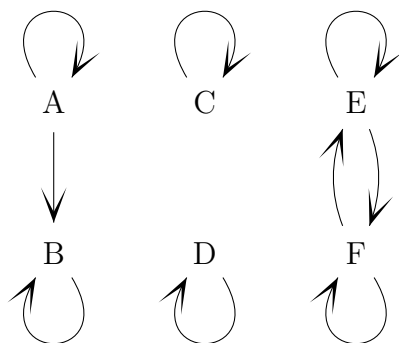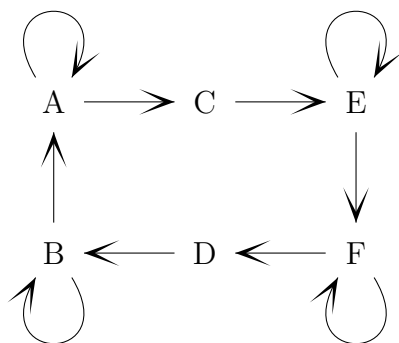**Name:** _____

NetID: _____   **Lecture:**   **B**

Discussion: **Friday   11   12   1   2   3   4**

1. (5 points)   Check all boxes that correctly characterize this relation on the set $\{A, B, C, D, E, F\}$.

Reflexive: ☐   Irreflexive: ☐

Symmetric: ☐   Antisymmetric: ☑

Transitive: ☐

2. (5 points) Suppose that R is a relation on a set A. Using precise mathematical words and notation, define what it means for R to be antisymmetric.

   Solution: For any $x, y \in A$, if xRy and yRx, then $x = y$. Or for any $x, y \in A$, if xRy and $x \neq y$, then $y \not\!R x$.

3. (5 points) Let T be the relation defined on set of pairs $(x, y) \in \mathbb{R}^2$ such that $(x, y)T(p, q)$ if and only if $x \leq p$ and $y \leq q$. Is T antisymmetric? Informally explain why it is, or give a concrete counter-example showing that it is not.

   Solution: This relation is antisymmetric. Suppose that $(x, y)T(p, q)$ and $(p, q)T(x, y)$. Then $x \leq p$ and $y \leq q$, and also $p \leq x$ and $q \leq y$. So $x = y$ and $y = q$. So $(x, y) = (p, q)$.