

Name: SSN: Row:

Question 1: A salesman wants to tour n cities ($n \in \mathbb{N} - \{1, 2, 3\}$) such that he visits each city just once and he finishes his tour at the city he started with. Guess a formula for the number of possible tours (should be a function of n , call it $T(n)$) and prove your claim using induction.

Question 2: Find equivalence relations $R_1, R_2, R_3, R_4, R_5, R_6$ on $\mathbb{R}^2$ such that

1. R_1 partitions $\mathbb{R}^2$ into straight lines perpendicular to the line $x = 0$.
2. R_2 partitions $\mathbb{R}^2$ into straight lines perpendicular to the line $y = 0$.
3. R_3 partitions $\mathbb{R}^2$ into circles centered at the origin.
4. R_4 partitions $\mathbb{R}^2$ into circles centered at the origin.
5. R_5 partitions $\mathbb{R}^2$ into circles centered at $(-1, 2)$.
6. R_6 partitions $\mathbb{R}^2$ into straight lines perpendicular to the line $5x - 7y - 8 = 0$.