

1 Relations

1. (a) Students of a school are taken to a railway museum to learn about railway heritage and its history.



An exhibit in the museum depicted many rail lines on the track near the railway station. Let L be the set of all rail lines on the railway track and R be the relation on L defined by

$$R = \{(l_1, l_2) : l_1 \parallel l_2\}$$

On the basis of the above information, answer the following questions:

- (i) Find whether the relation R is symmetric or not.
 - (ii) Find whether the relation R is transitive or not.
 - (iii) If one of the rail lines on the railway track is represented by the equation $y = 3x + 2$, then find the set of rail lines in R related to it.
- (b) Let S be the relation defined by $S = \{(l_1, l_2) : l_1 \perp l_2\}$ check whether the relation S is symmetric and transitive.