

### 3.4

1. Which of the following describe equivalence relations? For those that are not equivalence relations, specify which of  $(R), (S), (T)$  fail and illustrate the failures with examples.
    - (a)  $L_1 || L_2$  for straight lines in the plane if  $L_1$  and  $L_2$  are the same or are parallel.  
.
    - (b)  $L_1 \perp L_2$  for straight lines in the plane if  $L_1$  and  $L_2$  are perpendicular.  
.
    - (c)  $p_1 \sim p_2$  for Americans if  $p_1$  and  $p_2$  live in the same state.  
.
    - (d)  $p_1 \approx p_2$  for Americans if  $p_1$  and  $p_2$  live in the same state or in neighboring states.  
.
    - (e)  $p_1 \approx p_2$  for people if  $p_1$  and  $p_2$  have a parent in common.  
.
    - (f)  $p_1 \cong p_2$  for people if  $p_1$  and  $p_2$  have the same mother.  
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  2. For each example of an equivalence relation in Exercise 1, describe the members of some equivalence class.
    - (a) DO WORK HERE
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