4. (a) What is the difference between a key and a superkey? [3]

(b) Consider the relation schema PERSON(No, $Name$, $Location$, Age) and the relation state given below. Identify potential superkeys of PERSON.

No	$Name$	$Location$	Age
2	John	Bath	28
7	Conrad	York	45
8	John	Bath	28
2	John	Kent	35
7	Helen	York	31

[10]

(c) Suppose $X_1 \rightarrow Y_1$ and $X_2 \rightarrow Y_2$. Which of the following dependencies are true? Justify your answers with proofs or counterexamples.

$$X_1 \cap X_2 \rightarrow Y_1 \cap Y_2 \qquad X_1 \cup X_2 \rightarrow Y_1 \cap Y_2 \qquad X_1 \cup X_2 \rightarrow Y_1 \cup Y_2$$

[6]

(d) Consider the relation schema REL($Att1$, $Att2$). Characterise all valid database states under the assumptions dom($Att1$) = dom($Att2$) = INTEGER, $Att1 \rightarrow Att2$ and $Att2 \rightarrow Att1$. [6]

Total mark for this question: 25