Question 4 [3 marks]

Consider a relation schema R with a set of attributes $\alpha = \{A, B, C, D, E\}$ and the set of functional dependencies $\mathcal{F} = \{\ A \to BC,\ CD \to E,\ B \to D,\ E \to A\}$. List all of the candidate keys for R and show your work as to how you derived it.

Submission Details

You must submit one PDF file called `design.pdf` on the CSC343 MarkUs platform (https://markus108.(utm.utoronto.ca/csc343s22/) under the assignment called "Test". `design.pdf` may be hand drawn and must be legible, clear, and concise.

① $A \to BC \Rightarrow A \to B,\ A \to C$

$A \to B,\ B \to D \Rightarrow A \to D$

$A \to C,\ A \to D \Rightarrow A \to CD$

$A \to CD,\ CD \to E \Rightarrow A \to E$

② $B \to D,\ B \to B$

③ $C \to C$

④ $D \to D$

⑤ $E \to A,\ A \to R \Rightarrow E \to R$

⑥ $CD \to E,\ E \to R$

$\Rightarrow CD \to R$

Therefore $A \to A$, $A \to B$, $A \to C$, $A \to D$, $A \to E$ $\Rightarrow A \to R$

In conclusion, $A \to R$, $E \to R$, $CD \to R$

the candidate keys are A, E since we need the minimal attributes.