

CSE 103 : Discrete Mathematics

Assignment 1.2

Student ID : **1705066**

Name : Ataf Fazledin Ahamed

Problem no. 9

To be verified by : **1705024**

(Khandokar Rahat Hossain)

Question #9:

Are these system specifications consistent? “The system is in multiuser state if and only if it is operating normally. If the system is operating normally, the kernel is functioning. The kernel is not functioning or the system is in interrupt mode. If the system is not in multiuser state, then it is in interrupt mode. The system is not in interrupt mode.”

Answer:

Let m , n , k and i represent the propositions "The system is in multiuser state", "The system is operating normally", "The kernel is functioning," and "The system is in interrupt mode" respectively. Then we want to make the following expressions simultaneously true by the choice of truth values of m , n , k , i .

$$m \leftrightarrow n,$$

$$n \rightarrow k,$$

$$\neg k \vee i,$$

$$\neg m \rightarrow i,$$

$$\neg i$$

In order for this to happen, clearly, it must be false. In order for $\neg m \rightarrow i$ to be true when i is false, the hypothesis $\neg m$ must be false, so m must be true. Since we want $m \leftrightarrow n$ to be true, this implies that n must also be true. Since, we want $n \rightarrow k$ to be true, we must therefore have k true. But now if k is true and i is false, then the third specification $\neg k \vee i$ is false.

Therefore we conclude that the system isn't consistent.