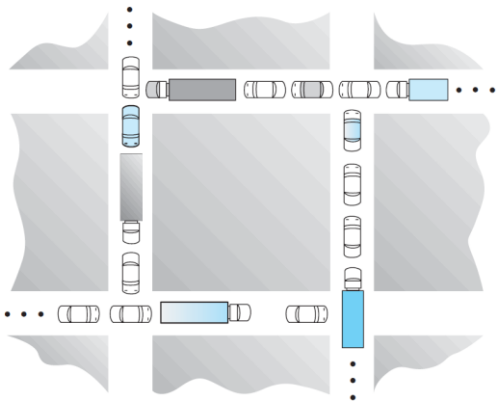
COSC1112/1114: Operating Systems Principles

Tutorial 06 (week 07)

1. Consider the traffic deadlock depicted blow.



   a) Show that the four necessary conditions for deadlock indeed hold in this example.
   b) State a simple rule for avoiding deadlocks in this system.

2. The program example shown below doesn't always lead to deadlock. Describe what role the CPU scheduler plays and how it can contribute to deadlock in this program.

```
/* thread one runs in this function */
void *do work one(void *param)
{
        pthread mutex lock(&first mutex);
        pthread mutex lock(&second mutex);

        /* Do some work*/

        pthread mutex unlock(&second mutex);
        pthread mutex unlock(&first mutex);
        pthread exit(0);
}
```

```
/* thread two runs in this function */
void *do work two(void *param)
{
        pthread mutex lock(&second mutex);
        pthread mutex lock(&first mutex);

        /*Do some work*/

        pthread mutex unlock(&first mutex);
        pthread mutex unlock(&second mutex);
        pthread exit(0);
}
```

3. Consider a system consisting of four resources of the same type that are shared by three processes, each of which needs at most two resources. Show that the system is deadlock-free.