長庚大學110學年度第一學期 作業系統 第三次小考

系級: 姓名: 學號:

1. (60%) There are three processes:
   - P_1: a * b → a
   - P_2: a * c → a
   - P_3: a + d → f

   The access to valuables "a" must be protected in a critical session, and P_1 and P_2 have to be completed before we run P_3. We now have three semaphores, and they are initialized as S_1=1, S_2=0 and S_3=0. Please provide the code of P_1, P_2 and P_3.

Answer:

P_1:

```
wati(S1);
a = a * b;
signal(S1);
signal(S2);
```

P_2:

```
wati(S1);
a = a * c;
signal(S1);
signal(S3);
```

P_3:

```
wati(S2);
wati(S3);
f = a + d;
```

2. (50%) For the reader-and-writer problem, please explain the following two parts of the reader

Writer:

```
wait(wrt);
……
writing is performed
……
signal(wrt)
```

Reader:

```
wait(mutex);
readcount++;
(a) if (readcount = = 1)
        wait(wrt);
signal(mutex);
… reading…
wait(mutex);
readcount--;
(b) if (readcount = = 0)
        signal(wrt);
signal(mutex);
```

Answer:

(a)

如果是第一個開始進行read的reader，需確認其與Writer互斥，也就是沒有Writer進行中Reader才能開始。

(b)

如果是最後一個結束read的reader，需通知與其互斥的Writer現在可以運行了。