

Assignment 3

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Task 1

- 1.1) D
- 1.2) A
- 1.3) C
- 1.4) C
- 1.5) D

Task 2

2.1) A hold and wait deadlock condition might occur

2.2)

If the order of the parbegin was consumer, producer then the items semaphore would become -1 which isn't allowed

(explanation in each line)

```
/* program producer/consumer */
```

```
semaphore items = 0, free = 1;
```

```
void consumer()
```

```
{
```

```
    while (true)
```

```
    {
```

```
        semWait(free); // free would become 0
```

```
        semWait(items); // items would become -1, which is not allowed, program would  
stop running
```

```
        take();
```

```
        semSignal(free);
```

```
        consume();
```

```
    }
```

```
}
```

```
void producer()
```

```
{
```

```

        while (true)
        {
            produce();
            semWait(free);
            append();
            semSignal(items);
            semSignal(free);
        }
    }

void main()
{
    parbegin (consumer, producer); // change is execution sequence
}

```

2.3) for the void consumer function I would change the while statement to “while(true and items > 0)”

Task 3

3.1) Traffic lights (assuming they don't turn off)

3.2) Mutual exclusion. Instead of 1 car going through the intersection all of them decided to go at the same time causing a deadlock.

Hold and wait: All the cars going North are waiting for the cars going east to move, All the cars going east are waiting for all the cars going South to go, All the cars going south are waiting for all the cars going West to go and finally all the cars going West are waiting for all the cars going North to go. Neither can go anywhere without the others going, causing a deadlock.

No pre-emption: None of the deadlocked cars can be removed from the intersections without the end cars leaving first.

Circular wait: The ability for the cars going north to move is dependant of the cars going east being able to move.

The ability for the cars going east to move is dependant of the cars going south being able to move.

The ability for the cars going south to move is dependant of the cars going west being able to move.

The ability for the cars going west to move is dependant of the cars going north being able to move.

Task 4

4.1) Process P2 and P3 can reach a deadlock state (circular wait).

If P1 and P4 do not give any information or data to R3 then P3 cannot continue to function and if P3 cannot function then P2 cannot function as P3 gives information or data to R2 which is used by P2.

4.2) Given processes : 4, P1-P4

Given resource types:3, R1-R3

Resource vector R: R1 = 3, R2 = 1, R3 = 1

Allocation				Claim			
	R1	R2	R3		R1	R2	R3
P1	1	0	1	P1	0	0	0
P2	1	0	0	P2	0	1	0
P3	0	1	0	P3	0	0	1
P4	0	0	1	P4	0	0	0
Available							
R1	R2	R3					
1	0	0					