Score:_____   Name:_____
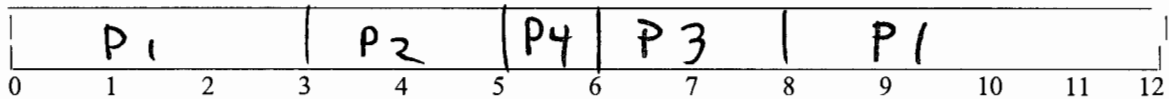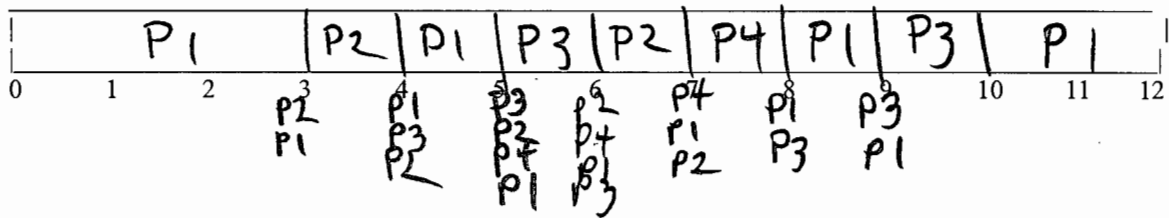**ECE 3055 Quiz - OS Topics & CPU Scheduling**

1. The following processes arrive for execution at the times indicated. Use preemptive scheduling for SRTF and RR. Base all decisions on the information you have at the time the decision is made. At arrival time, the burst execution time is known. For RR and SRTF, assume a newly arrived process is in the ready queue just prior to its arrival time (i.e. it is already in the tail of the ready queue, just before the running process is stopped and is added to tail of the ready queue at a time slice.)

Process	Arrival Time	CPU Burst or Execution Time
P1	0.0ms	7ms
P2	3.0ms	2ms
P3	4.0ms	2ms
P4	5.0ms	1ms

Draw a Gantt chart using SRTF (SJF with preemption):

| P1 | P2 | P4 | P3 | P1 |
Marks: 0 1 2 3 4 5 6 7 8 9 10 11 12

Draw a Gantt chart using RR with time slice = 1ms:

| P1 | P2 | P1 | P3 | P2 | P4 | P1 | P3 | P1 |
Marks: 0 1 2 ... 10 11 12

(handwritten queue notes below chart)
```
P2   P1   P3   P2   P4   P1   P3   P1
P1   P3   P2   P4   P1   P1   P3   P1
     P2   P4   P1   P2   P3
     P1   P3   P3   P2   P1
```

Fill in the table below (convert to **decimal – no fractions!**):

	Average Turnaround Time	Average Wait Time
SRTF	4.75	1.75
RR	6.25	3.25

2. Assuming the OS has many processes running, in which major OS process queue would you find a compute bound process spending the majority of it's turnaround time?

   ready queue

3. Other than a processor with lots of memory and a disk, what other hardware support features are required for a modern secure multitasking OS? (Explain why)

   time slice interrupt - protects CPU

   mode bit - I/O instructions only execute in kernel

   memory protection with VM - applications can't overwrite OS