EECS 3221M Winter 2019
Practice Questions

1. For each of the statements below, circle the “T” letter following the statement if the statement is true; circle the “F” letter following the statement if the statement is false.

(a) The *store* instruction moves the content of a *register* to *main memory*.
T F

(b) With *symmetric multiprocessing*, no *master-slave relationship* exists between processors.
. T F

(c) The o*perating system kernel* is normally pre-loaded into memory and ready to be executed immediately after the power is turned on. T F

(d) The *many-to-one* multithreading model provides more concurrency than the *one-to-one* multithreading model. T F

(e) In the *Storage-Device Hierarchy* in a computer system, the *cost per bit* of a storage device at a *higher level* should never be *cheaper* than the *cost per bit* of a storage device at a *lower level*. T F

(f) With *indirect communication*, a communication link is established automatically when processes *send or receive messages*.
. T F

(g) With *Direct Memory Access (DMA)*, the device controller can transfer any amount of data from buffer storage directly to main memory without using any *interrupts*.
. T F

(h) In modern general purpose operating systems, an *interrupt* always causes the system to execute in *kernel mode*.
T F

(i) *Application programs* can modify the content of the *timer* in *user mode*.
. T F

2. Calculate the (a) *average waiting time*; and (b) *average turnaround time*, respectively, when the following scheduling algorithms are used to schedule the set of processes with corresponding arrival times and burst times below:

(1) Round Robin (RR) Scheduling (you may assume that the time quantum is 4, and the context switch time is 0 for Round Robin Scheduling)
(2) SJF Nonpreemptive Scheduling
(3) SJF Preemptive Scheduling

Process	Arrival Time	Burst Time
P_1	0.0	11
P_2	2.0	9
P_3	7.0	3

3. Answer the following questions.

3.1. Assume that BUFFER_SIZE = 8 in the Bounded Buffer – Shared Memory Solution *that does not require the use of semaphores* for the Producer-Consumer Problem. Assume the following sequence of executions:

(a) The Producer process performs six (6) executions of *all* the code in the body of the while loop for the Producer process;

(b) After (a), the Consumer process performs four (4) executions of *all* the code in the body of the while loop for the Consumer process;

(c) After (b), the Producer process attempts to execute ***as many times as possible*** *all* the code in the body of the while loop for the Producer process while the Consumer process does not execute any further.

You are required to fill in the answer for each of the following questions:

(1) In (c) above, *the total number of times* that the Producer process will be able to execute *all* the code in the body of the while loop for the Producer process is ____________________.

(2) After (c), the value for the integer variable "*in*" will be ________________.

(3) After (c), the value for the integer variable "*out*" will be _______________.

3.2. Assume that BUFFER_SIZE = 8 in the Bounded Buffer – Shared Memory Solution *that does not require the use of semaphores* for the Producer-Consumer Problem. Assume the following sequence of executions:

(a) The Producer process performs six (6) executions of *all* the code in the body of the while loop for the Producer process;

(b) After (a), the Consumer process performs four (4) executions of *all* the code in the body of the while loop for the Consumer process;

(c) After (b), the Producer process attempts to execute ***as many times as possible*** *all* the code in the body of the while loop for the Producer process while the Consumer process does not execute any further.

(d) After (c), the Consumer process attempts to execute as many times as possible *all* the code in the body of the while loop for the Consumer process while the Producer process does not execute any further.

You are required to fill in the answer for each of the following questions:

(1) In (d) above, the *total number of times* that the Consumer process will be able to execute *all* the code in the body of the while loop for the Consumer process is __________________.

(2) After (d), the value for the integer variable "*in*" will be _______________.

(3) After (d), the value for the integer variable "*out*" will be ______________.

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Answers to Practice Questions

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(b) With *symmetric multiprocessing*, no *master-slave relationship* exists between processors.
. **T** F

(c) The o*perating system kernel* is normally pre-loaded into memory and ready to be executed immediately after the power is turned on. T **F**

(d) The *many-to-one* multithreading model provides more concurrency than the *one-to-one* multithreading model. T **F**

(e) In the *Storage-Device Hierarchy* in a computer system, the *cost per bit* of a storage device at a *higher level* should never be *cheaper* than the *cost per bit* of a storage device at a *lower level*. **T** F

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2. Calculate the (a) *average waiting time*; and (b) *average turnaround time*, respectively, when the following scheduling algorithms are used to schedule the set of processes with corresponding arrival times and burst times below:

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Process	Arrival Time	Burst Time
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Answers:

(1) RR:
(a) ***average waiting time: 28/3 = 9.33..***
(b) ***average turnaround time: 51/3 = 17***

(2) SJF Nonpreemptive Scheduling:
(a) ***average waiting time: 16/3 = 5.33..***
(b) ***average turnaround time: 39/3 = 13***

(3) SJF Preemptive Scheduling:
(a) ***average waiting time: 15/3 = 5***
(b) ***average turnaround time: 38/3 = 12.66..***

3. Answer the following questions.
3.1. Assume that BUFFER_SIZE = 8 in the Bounded Buffer – Shared Memory Solution *that does not require the use of semaphores* for the Producer-Consumer Problem. Assume the following sequence of executions:

(a) The Producer process performs six (6) executions of *all* the code in the body of the while loop for the Producer process;

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(c) After (b), the Producer process attempts to execute ***as many times as possible*** *all* the code in the body of the while loop for the Producer process while the Consumer process does not execute any further.

You are required to fill in the answer for each of the following questions:

(1) In (c) above, *the total number of times* that the Producer process will be able to execute *all* the code in the body of the while loop for the Producer process is ______**_5**__________.

(2) After (c), the value for the integer variable "*in*" will be ______**3**________.

(3) After (c), the value for the integer variable "*out*" will be _____**4**________.

3.2. Assume that BUFFER_SIZE = 8 in the Bounded Buffer – Shared Memory Solution *that does not require the use of semaphores* for the Producer-Consumer Problem. Assume the following sequence of executions:

(a) The Producer process performs six (6) executions of *all* the code in the body of the while loop for the Producer process;

(b) After (a), the Consumer process performs four (4) executions of *all* the code in the body of the while loop for the Consumer process;

(c) After (b), the Producer process attempts to execute ***as many times as possible*** *all* the code in the body of the while loop for the Producer process while the Consumer process does not execute any further.

(d) After (c), the Consumer process attempts to execute as many times as possible *all* the code in the body of the while loop for the Consumer process while the Producer process does not execute any further.

You are required to fill in the answer for each of the following questions:

(1) In (d) above, the *total number of times* that the Consumer process will be able to execute *all* the code in the body of the while loop for the Consumer process is ______**7_**________.

(2) After (d), the value for the integer variable "*in*" will be _____**3**_________.

(3) After (d), the value for the integer variable "*out*" will be ____**3**__________.