Week 4 : Assignment 4

The due date for submitting this assignment has passed.

Due on 2021-09-01, 23:59 IST.

As per our records you have not submitted this assignment.

1) Consider two periodic task sets A and B shown in the following two tables. Would these two task sets be schedulable on uniprocessors under rate monotonic scheduling? Use the Liu-Layland criterion for determining their schedulability. 1 point

Task Set A (All times are in milliseconds)			
Task Name	**Execution time**	**Period**	**Deadline**
Task1	20	100	100
Task 2	15	150	150
Task 3	40	400	400

Task Set B (All times are in milliseconds)			
Task Name	**Execution time**	**Period**	**Deadline**
Task1	40	100	100
Task 2	20	80	80
Task 3	50	200	200

a. None of the two task sets is schedulable
b. Task set A is schedulable but Task set B is not
c. Task set B is schedulable but Task set A is not
d. Both task sets are schedulable
e. Liu-Layland criterion cannot be applied

- a.
- b.
- c.
- d.
- e.

No, the answer is incorrect.
Score: 0
Accepted Answers:
b.

2) Consider two periodic task sets A and B shown in the following two tables. Would these two task sets be schedulable on uniprocessors under rate monotonic scheduling? Use the Liu-Lehoczky's criterion for determining their schedulability. 1 point

Task Set A (All times are in milliseconds)			
Task Name	**Execution time**	**Period**	**Deadline**
Task1	20	100	100
Task 2	15	150	150
Task 3	40	400	400

Task Set B (All times are in milliseconds)			
Task Name	**Execution time**	**Period**	**Deadline**
Task1	40	100	100
Task 2	20	80	80
Task 3	50	200	200

a. None of the task sets is schedulable
b. Task set A is schedulable but Task set B is not
c. Task set B is schedulable but Task set A is not
d. Both task sets are schedulable
e. Liu-Lehoczky criterion cannot be applied

- a.
- b.
- c.
- d.
- e.

No, the answer is incorrect.
Score: 0
Accepted Answers:
d.

3) Suppose a rate monotonic scheduler is used to schedule a set of periodic hard real-time tasks on a uniprocessor. Which one of the following characteristics can guarantee schedulability of a task set even when its processor utilization approaches 100%? 1 point

a. Task periods are relatively prime to each other
b. Task periods are harmonically related
c. Tasks have zero phasings
d. Tasks have non-zero phasings
e. Task execution times are harmonically related

- a.
- b.
- c.
- d.
- e.

No, the answer is incorrect.
Score: 0
Accepted Answers:
b.

4) Consider two arbitrary periodic hard real-time tasks are to be run on a uniprocessor using a rate monotonic scheduler. For the two tasks to run without missing any deadlines, what should be the maximum processor utilization due to the two tasks? 1 point

a. 0.887
b. 0.824
c. 0.765
d. 0.736
e. 0.698

- a.
- b.
- c.
- d.
- e.

No, the answer is incorrect.
Score: 0
Accepted Answers:
b.

5) Consider the periodic real-time task shown in the following table. The task set is to be scheduled on a uniprocessor using a rate monotonic scheduler. What would be the worst case completion time for the task T1? 1 point

Task Set (All times are in milliseconds)				
Task Name	**Phase**	**Execution time**	**Period**	**Deadline**
T1	100	30	100	100
T2	200	50	150	150
T3	300	20	80	80

a. 30 milliseconds
b. 40 milliseconds
c. 50 milliseconds
d. 70 milliseconds
e. 90 milliseconds

- a.
- b.
- c.
- d.
- e.

No, the answer is incorrect.
Score: 0
Accepted Answers:
d.

6) Which of the following statements concerning scheduling of a set of periodic hard real-time tasks on a uniprocessor are true? 1 point

a. Under RMS (rate monotonic scheduler), the achievable utilization of a set of hard real-time periodic tasks would be lower when task periods are multiples of each other compared to the case when they are not.
b. Even if a task set passes the Liu-Layland's criterion, the schedulability of the task set under RMS cannot be guaranteed unless it passes the Liu-Lehoczky's criterion as well.
c. While scheduling a set of independent hard real-time periodic tasks on a uniprocessor, RMS can be as proficient as EDF (earliest deadline first) for task sets whose periods satisfy some constraints.
d. For scheduling real-time tasks in practical uniprocessor based real-time systems, sub-optimal heuristic scheduling algorithms are normally used as optimal scheduling algorithms are computationally untractable.
e. When a set of tasks are scheduling using a rate monotonic scheduler, a higher priority task is guaranteed to not miss its deadline on account of a lower priority task getting late.

- a.
- b.
- c.
- d.
- e.

No, the answer is incorrect.
Score: 0
Accepted Answers:
c,
e.

7) Consider a set of periodic hard real-time tasks whose characteristics are shown in the following table. Would this task set be schedulable on a uniprocessor under rate monotonic scheduling? Consider only Liu-Layland criterion for schedulability. 1 point

Task Set A (All times are in milliseconds)			
Task	**Execution time**	**Period**	**Deadline**
Task1	20	100	100
Task 2	25	150	150
Task 3	40	400	400

a. Not likely to be schedulable but no guarantee can be given
b. Likely to be schedulable but no guarantee can be given
c. Guaranteed to be schedulable
d. Guaranteed to be unschedulable
e. Liu-Layland criterion cannot be used

- a.
- b.
- c.
- d.
- e.

No, the answer is incorrect.
Score: 0
Accepted Answers:
c.

8) Consider a set of three periodic hard real-time tasks is to be run on a uniprocessor using a rate monotonic scheduler. The task characteristics are given in the following table. What would be the worst case completion time for the task T2? 1 point

Task Set (All times are in milliseconds)				
Task Name	**Phase**	**Execution time**	**Period**	**Deadline**
T1	200	25	100	100
T2	150	25	150	150
T3	100	30	80	80

a. 30 milliseconds
b. 55 milliseconds
c. 85 milliseconds
d. 110 milliseconds
e. 135 milliseconds

- a.
- b.
- c.
- d.
- e.

No, the answer is incorrect.
Score: 0
Accepted Answers:
a.

9) Suppose a single periodic hard real-time task requires an execution time of 100 milliseconds every 100 milliseconds. This task is to be run on a uniprocessor using a rate monotonic scheduler. Which of the following statements are true regarding the schedulability of this task? 1 point

a. By Liu-Layland's criterion it will meet all its deadlines
b. By Liu-Layland's criterion it will not meet any of its deadlines
c. By Liu-Lehoczky's criterion it will meet all its deadline
d. By Liu-Lehoczky's criterion it will miss all its deadline
e. By Liu-Lehoczky's criterion it will occasionally miss some of its deadline
f. Liu-Lehoczky criterion cannot be used, consequently no results can be given

- a.
- b.
- c.
- d.
- e.
- f.

No, the answer is incorrect.
Score: 0
Accepted Answers:
e.

10) Consider a set of three periodic real-time tasks whose characteristics have been shown in the following table. Would this task set be schedulable on a uniprocessor under rate monotonic scheduling? Use the Liu-Layland's criterion for determining schedulability. 1 point

Task Set A (All times are in milliseconds)				
Task	**Phase**	**Execution time**	**Period**	**Deadline**
Task1	50	40	100	100
Task 2	100	20	200	200
Task 3	150	50	500	500

a. The task set is not schedulable
b. The task set is schedulable
c. Prima facie the task set is schedulable, but further analysis using the Liu-Lehoczky's criterion needs to be made before any guarantees can be given
d. Schedulability cannot be determined by using Liu-Layland criterion since the tasks have non-zero phasings
e. Liu-Layland criterion cannot be used

- a.
- b.
- c.
- d.
- e.

No, the answer is incorrect.
Score: 0
Accepted Answers:
b.

11) Which of the following statements concerning scheduling a set of periodic real-time tasks on a uniprocessor are false? 1 point

a. While scheduling a set of independent hard real-time periodic tasks on a uniprocessor, RMS can be as proficient as EDF under some constraints on the task set.
b. EDF is the optimal task scheduler for running a set of periodic hard real-time tasks on a uniprocessor.
c. EDF has better transient overload handling capability as compared to RMS.
d. RMS is more proficient as compared to the time-sliced round-robin algorithm for scheduling a set of soft real-time tasks on a uniprocessor.
e. Resource sharing among a set of real-time tasks is easier to support while using the EDF as compared while using RMS

- a.
- b.
- c.
- d.
- e.

No, the answer is incorrect.
Score: 0
Accepted Answers:
a,
d.

12) Suppose the set of three tasks shown in the following table are to be run on a uniprocessor by using a rate monotonic scheduler. Which one of the following is a correct priority assignment to the tasks? Assume that the higher the priority value assigned to a task, the lower in its priority. Also assume that Priority(Ti) gives the priority value assigned to the task Ti. 1 point

Task	Execution Time (in millisec)	Period (in millisec)	Deadline (in millisec)
T1	20	150	150
T2	40	200	200
T3	10	100	100

a. Priority(T1)=1, Priority(T2)=2, Priority(T3)=3
b. Priority(T1)=3, Priority(T2)=2, Priority(T3)=1
c. Priority(T1)=2, Priority(T2)=3, Priority(T3)=1
d. Priority(T1)=2, Priority(T2)=1, Priority(T3)=3
e. Priority(T1)=3, Priority(T2)=1, Priority(T3)=2
f. Priority(T1)=1, Priority(T2)=3, Priority(T3)=2

- a.
- b.
- c.
- d.
- e.
- f.

No, the answer is incorrect.
Score: 0
Accepted Answers:
c.