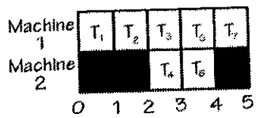
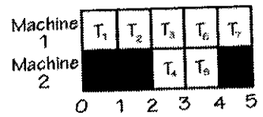
3. Some tasks include making sure you have enough folding chairs for people to sit on, ordering the food that will be served, cooking the food to be served, having some takeout food delivered, cleaning prior to the arrival of your guests, etc. The processors used include people, and perhaps the stove, oven, and microwave. Many of the tasks can be going on at the same time.

4. Jocelyn must perhaps launder her clothes, arrange care for her cat, pack, arrange for a taxi to the airport, and get to the airport. Unless she can get a friend to help her with some of these tasks, she must do all the tasks herself. She can launder her clothes during the time she arranges for a taxi, but most of the tasks cannot be done simultaneously.

5. **(a)** Processor 1: T_1, T_2, T_3, T_5, T_7.
Processor 2: Idle 0 to 2, T_4, T_6, idle 4 to 5.



(b) Processor 1: T_1, T_2, T_3, T_6, T_7.
Processor 2: Idle 0 to 2, T_4, T_5, idle 4 to 5.



(c) Yes.

(d) No.

(e) T_3 and T_5.

6. **(a)** The critical path has length 32.

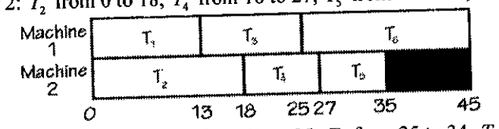
(b) **(1)** Processor 1: T_1, T_3, T_5, idle 30 to 44.
Processor 2: T_2, T_4, T_6, T_7, idle 36 to 38.

(2) Processor 1: T_2, T_5, T_6, T_7.
Processor 2: T_1, T_3, T_4, idle 33 to 41.

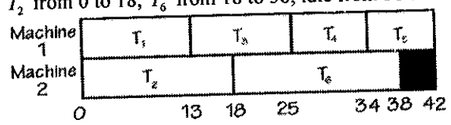
(c) No.

(d) The sum of the task time divided by 2 is 37. Hence, no schedule can finish earlier than time 37.

7. **(a)** i. Processor 1: T_1 from 0 to 13, T_3 from 13 to 25, T_6 from 25 to 45.
Processor 2: T_2 from 0 to 18, T_4 from 18 to 27, T_5 from 27 to 35, idle from 35 to 45.



ii. Processor 1: T_1 from 0 to 13, T_3 from 13 to 25, T_4 from 25 to 34, T_5 from 34 to 42.
Processor 2: T_2 from 0 to 18, T_6 from 18 to 38, idle from 38 to 42.



(b) The schedule produced in (ii) is optimal, because the sum of the task times is 80 and no set of tasks can be arranged that will feasibly sum to 40 on each processor.

(c) The critical path is T_2, T_6, and it has length 38. No schedule can be completed by time 38 on two processors because the sum of the task times divided by 2 is 40.

8. **(a)** i. Processor 1: T_1, T_3, T_6. Processor 2: T_2, T_4, T_5, idle 37 to 43.

ii. Processor 1: T_1, T_3, T_4, T_5. Processor 2: T_2, T_6, idle 38 to 42. The second is optimal. The critical path is T_2, T_6 and has length 38. No schedule on two machines finishes by 38 because the total time for all the tasks is 80. Thus, on two machines no earlier time than $\frac{80}{2} = 40$ is possible.

(b) The optimum completion time before and after the two task times are switched is the same.

9. **(a)** Yes. Suppose the original order requirement digraph has three tasks each taking 6 time units and no edges. Drawing an edge between two of these tasks now lengthens the critical path to 12.

(b) No. All the pre-existing paths have the same length and some new paths might be created. Thus, the length of the longest path cannot go down.