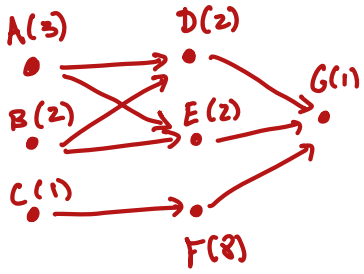
Worksheet 15 (Scheduling 1): Priority Lists and Decreasing Time Algorithm

Group Names: _____

1. The following tasks need to be completed for a project.

Task	Time Required	Prerequisites
A	3 hours	
B	2 hours	
C	1 hour	
D	2 hours	A, B
E	2 hours	A, B
F	8 hours	C
G	1 hours	D, E, F

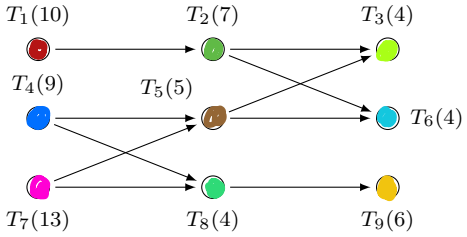


(a) To the left of the chart, draw a digraph to represent this project.

(b) If there is only one processor, how long will it take to complete the project? 19 hours

(c) The critical time can be determined by looking at the longest sequence of tasks in the digraph, called the critical path.
What is the critical path for this project? C → F → G
What is the critical time? 10 hours

2. Consider the following digraph:



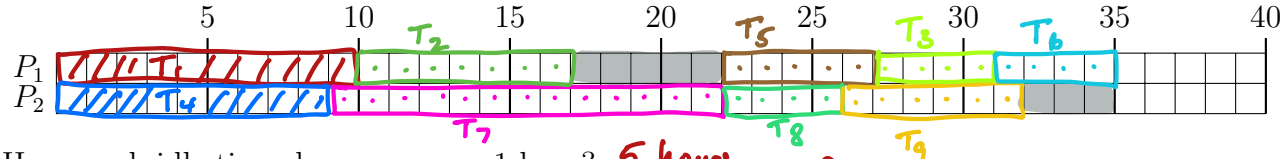
time	ready	done
0	T_1 T_4 T_7	
9	T_2	T_4
10	T_2	T_1
17		T_2
22	T_5 T_8	T_7
26	T_9	T_8
27	T_3 T_6	T_5
31	T_6	T_3

time	ready	done
32		T_9
35		T_6

(a) Create a schedule using the priority list

$$T_1, T_2, T_3, T_4, T_5, T_6, T_7, T_8, T_9$$

assuming you have only two processors.

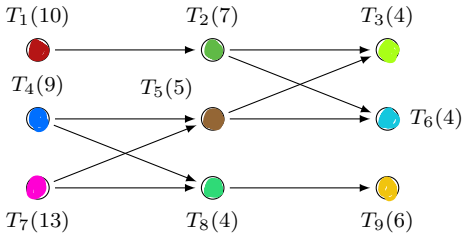


(b) How much idle time does processor 1 have? 5 hours
How much idle time does processor 2 have? 3 hours
} in gray

(c) Here's the digraph again. Create a schedule using the same priority list

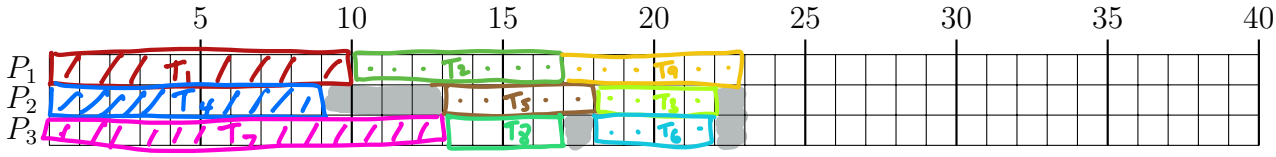
$$T_1, T_2, T_3, T_4, T_5, T_6, T_7, T_8, T_9$$

assuming you have three processors.



time	ready	done
0	T_1 T_4 T_7	
9		T_4
10	T_2	T_1
13	T_5 T_8	T_7
17	T_9	T_2 T_8
18	T_3 T_6	T_5

time	ready done
22	T_3 T_6
23	T_9



(d) How does the time to completion compare with using two processors?

This took 23 hours, vs 35 hours

How does the idle time compare?

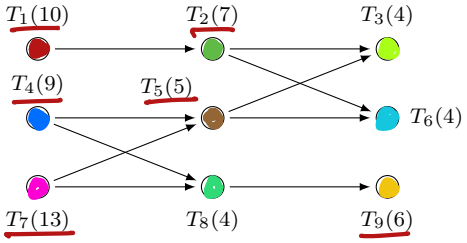
This had P_1 w/4 idle hours, P_2 with 1, P_3 with 2. Total idle = 7 hours, vs 8

(e) What is the critical path for this digraph? $T_7 \to T_8 \to T_9$ = 13 + 4 + 6 = 23 hours

Have you found an optimal schedule? How do you know?

Yes! Critical time = 23 hours and this used 23 hours. We can't do better.

(f) The Decreasing Time Algorithm says: Create the priority list by listing the tasks in order from longest completion time to shortest completion time.



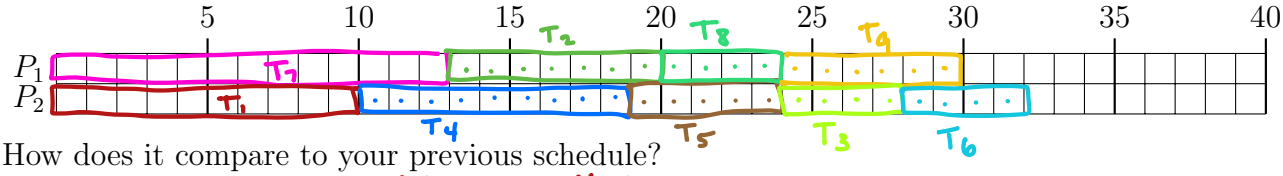
time	ready	done
0	T_7 T_1 T_4	
10	T_4 , T_2	T_1
13	T_2	T_7
19	T_5 T_8	T_4
20	T_8	T_2
24	T_9 T_3 T_6	T_5, T_8
28	T_6	T_3

time	ready done
30	T_9
32	T_6

What priority list do you get if you prioritize the tasks using the Decreasing Time Algorithm?

T_7, T_1, T_4, T_2, T_9, T_5, T_3, T_6, T_8

(g) Create a schedule using the priority list you just found using the Decreasing Time Algorithm, assuming you have only two processors. How long does it take? 32 hours



How does it compare to your previous schedule?

It's 3 days faster and has no idle time.