

Lecture Notes: Scheduling, Backflow and Critical Path Algorithms

Math F113X Math and Society

Goal:

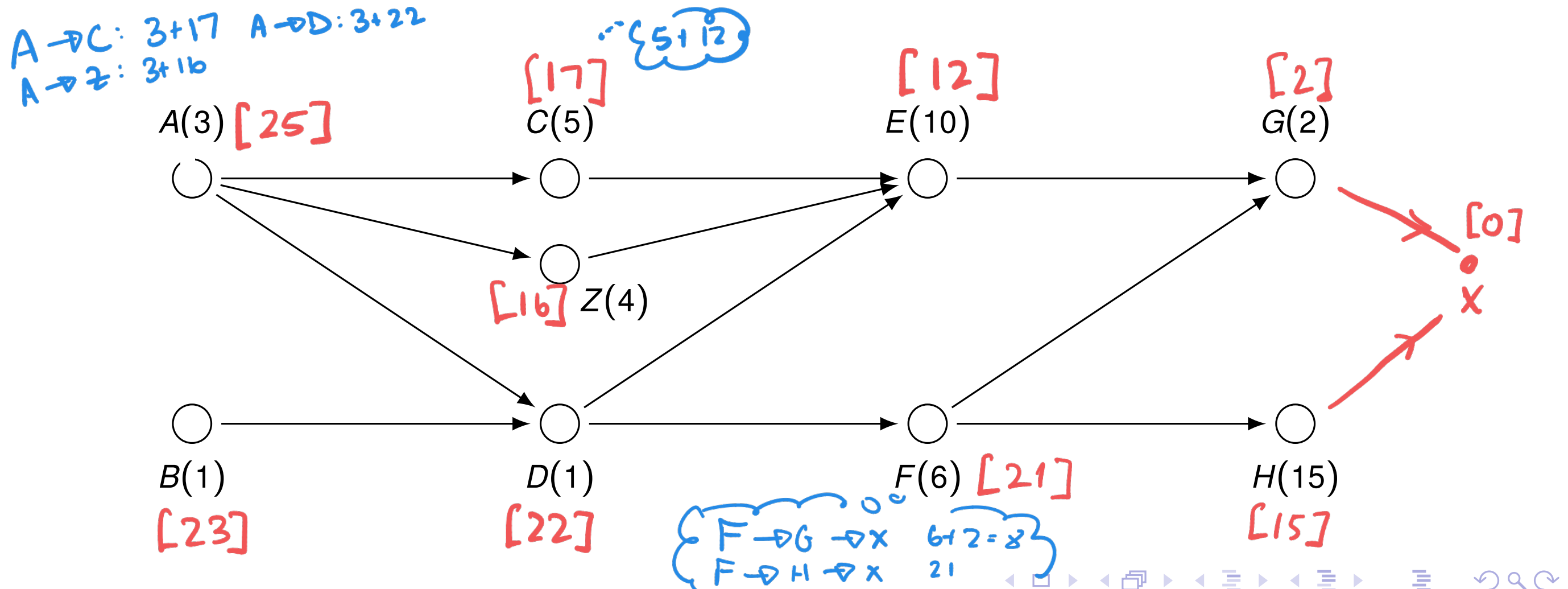
Learn the Backflow Algorithm and implement the Critical Path Algorithm.

Backflow Algorithm:

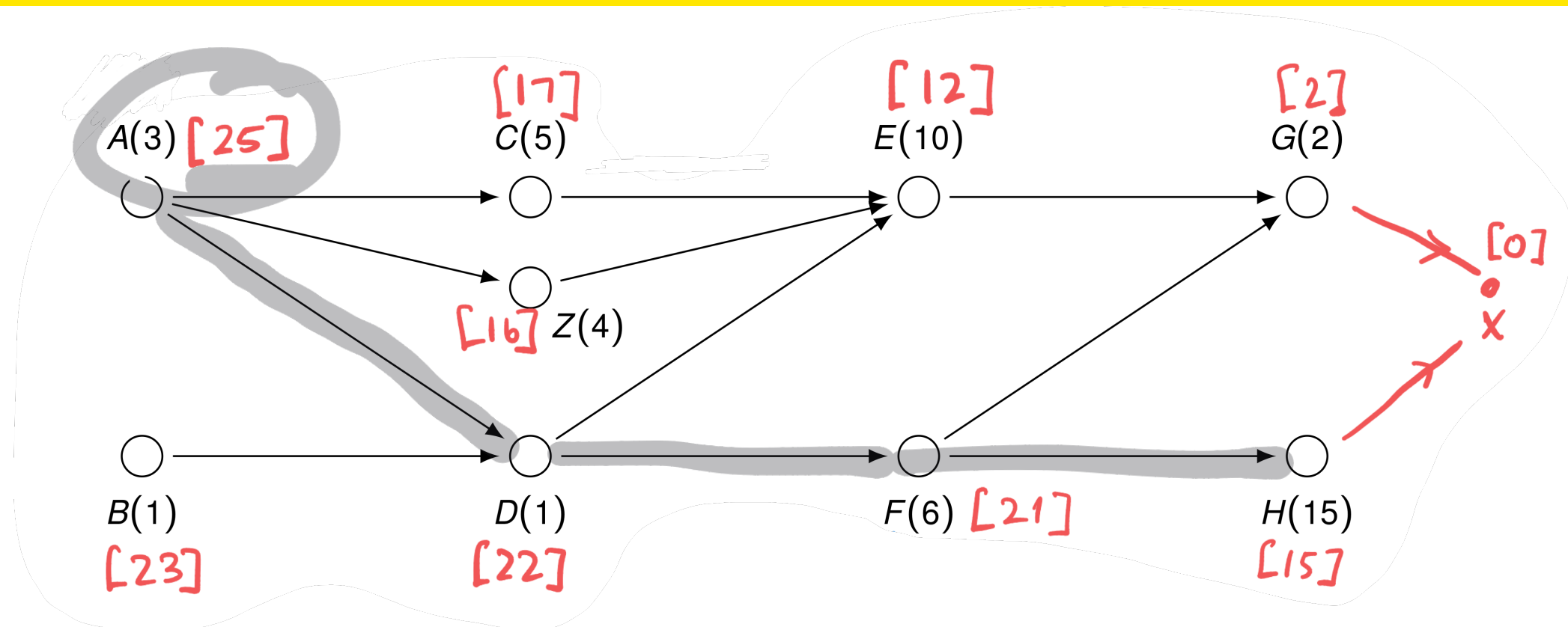
- (a) Introduce an “end” vertex, say X , with a time of $[0]$.
- (b) From X , move back through every vertex assigning it the maximum time to reach vertex X .

Backflow Algorithm

- Introduce an “end” vertex, say X , with a time of $[0]$.
- From X , move back through every vertex assigning it the maximum time to reach vertex X .



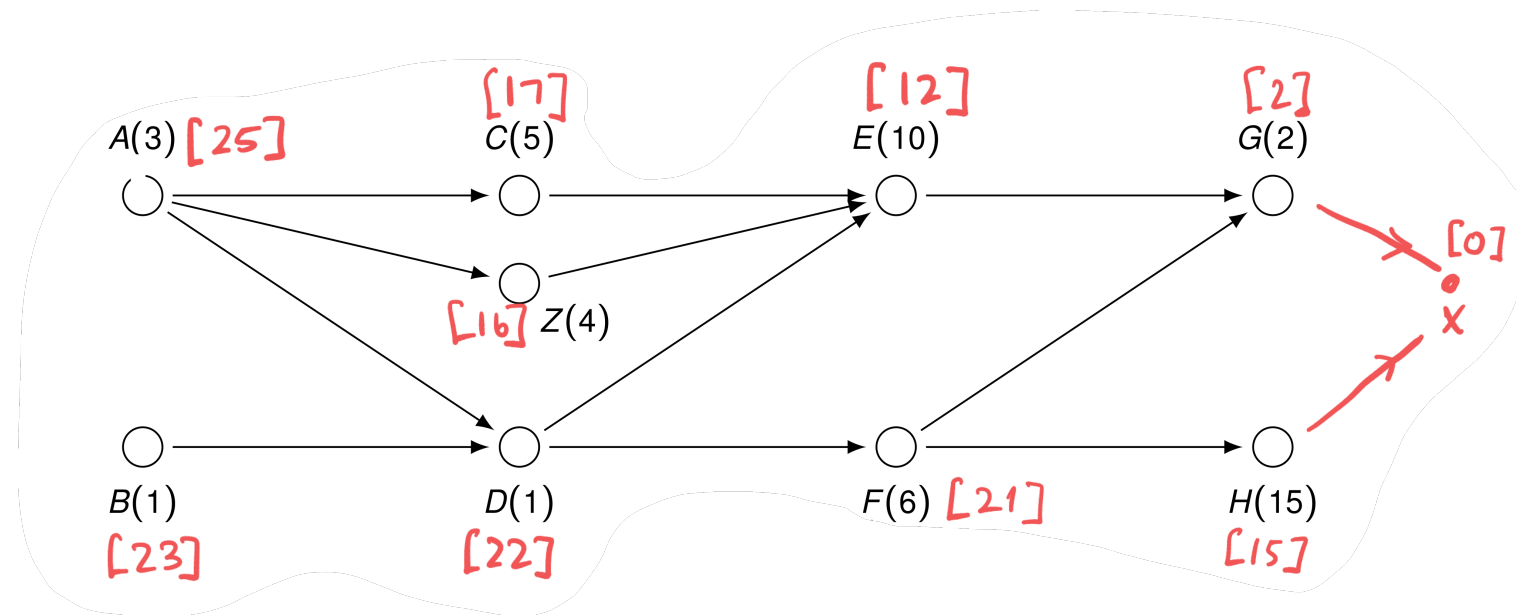
Use your work above to answer the questions below



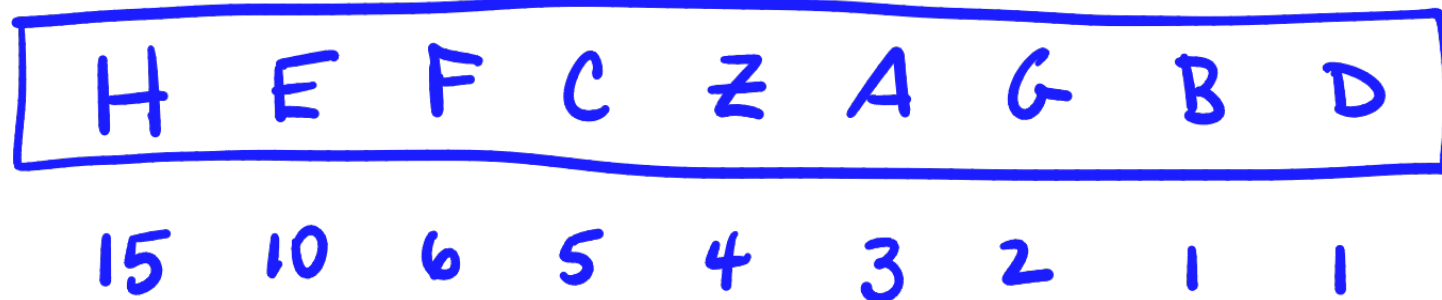
(a) Find a critical path and the critical time in the digraph above. What do you observe about the numbers you produced in the Backflow Algorithm?

Critical path is $A \rightarrow D \rightarrow F \rightarrow H$
Critical time = 25 = bracket label of A

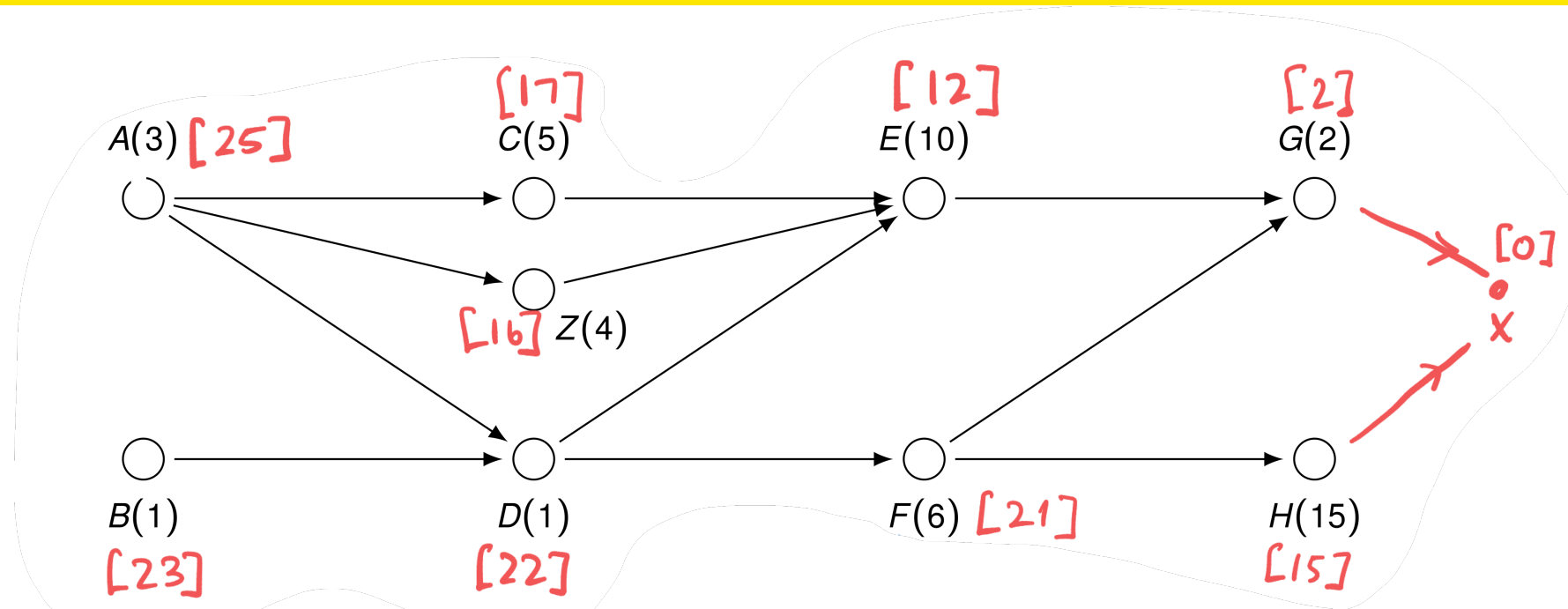
Use your work above to answer the questions below



(b) Determine the priority list using the **Decreasing Time Algorithm**.



Use your work above to answer the questions below



(c) Determine the priority list by ordering the the vertices according to decreasing **critical time** (the labels from the Backflow Algorithm).

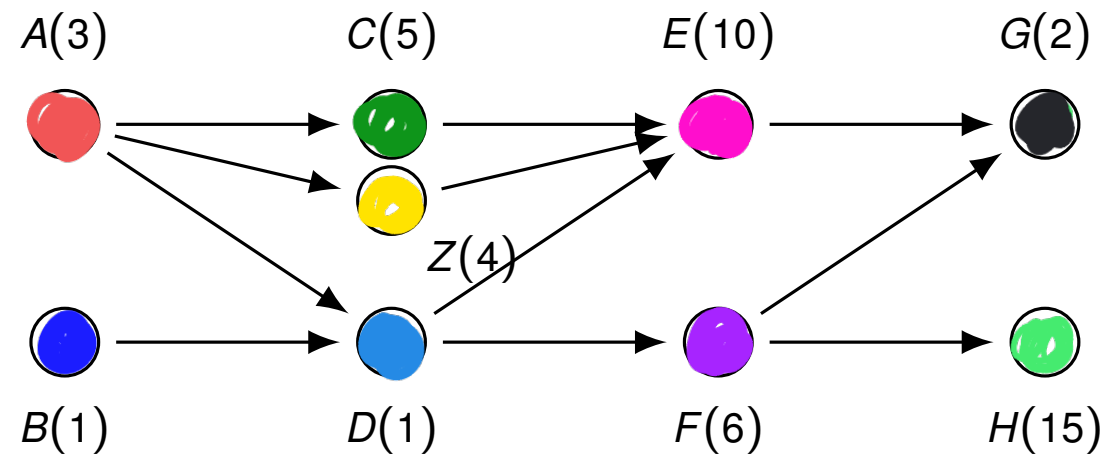
A B D F C H Z E G
25 23 22 21 17 15 16 12 2

Critical Path Algorithm

Make a priority list
by ordering vertices in decreasing order
(largest to smallest) according to critical time
(Backflow algorithm labels)

Then schedule using that priority list

Construct a schedule using two processors



Finishing Time
= 24

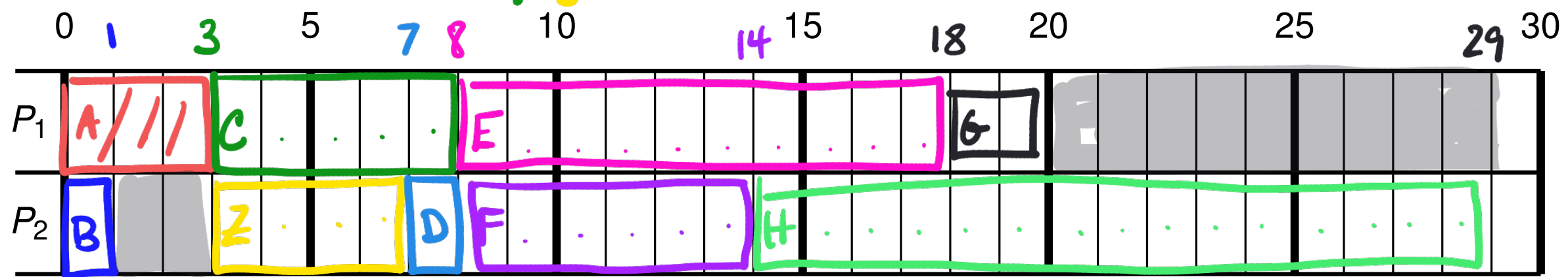
Critical time =
25

11 units
idle time

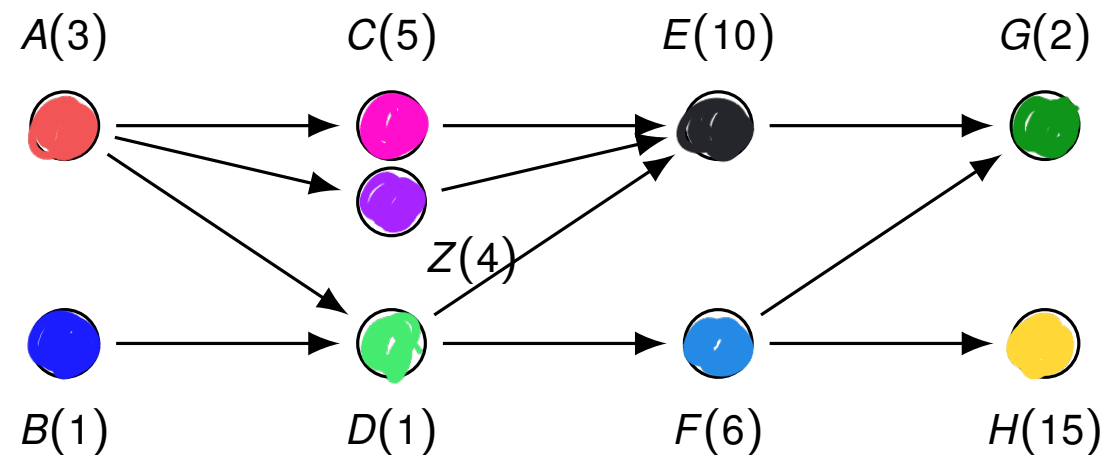
(a) decreasing time priority list: H E F C Z A G B D

time	0	1	3	7	8	14	18	20	24
done	—	B	A	Z	C, D	F	E	G	H
ready	A, B		C, Z, D	D	E, F	H	G		

← everything done!



Construct a schedule using two processors



Finishing time = 25
 optimal since it equals the critical time!
 3 units idle time

(b) decreasing **critical** time priority list: A B D F C H Z E G

time	0	1	3	4	8	10	12	22	24	25
done	—	B	A	D	C	F	Z	E	G	H
ready	A, B		D, C, Z	F, Z	Z	H	E	G	—	—

← everything is done!

