

Advanced Process Mining

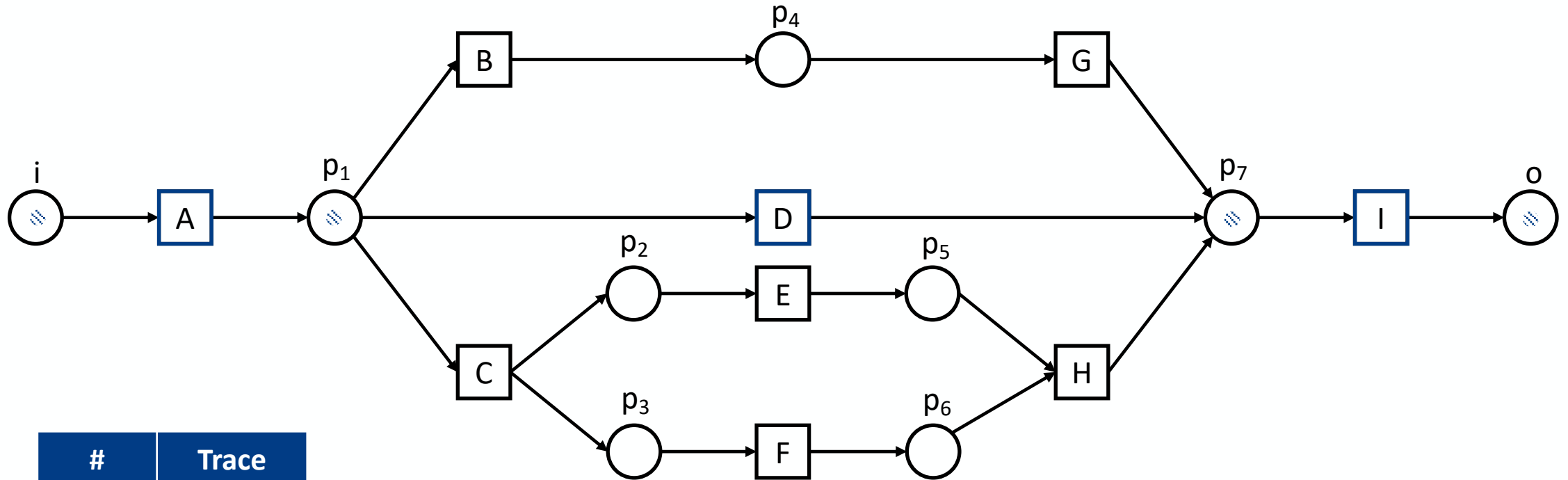
Sommer term 2020

Exercise sheet 4

Token Replay

Token Replay

Example



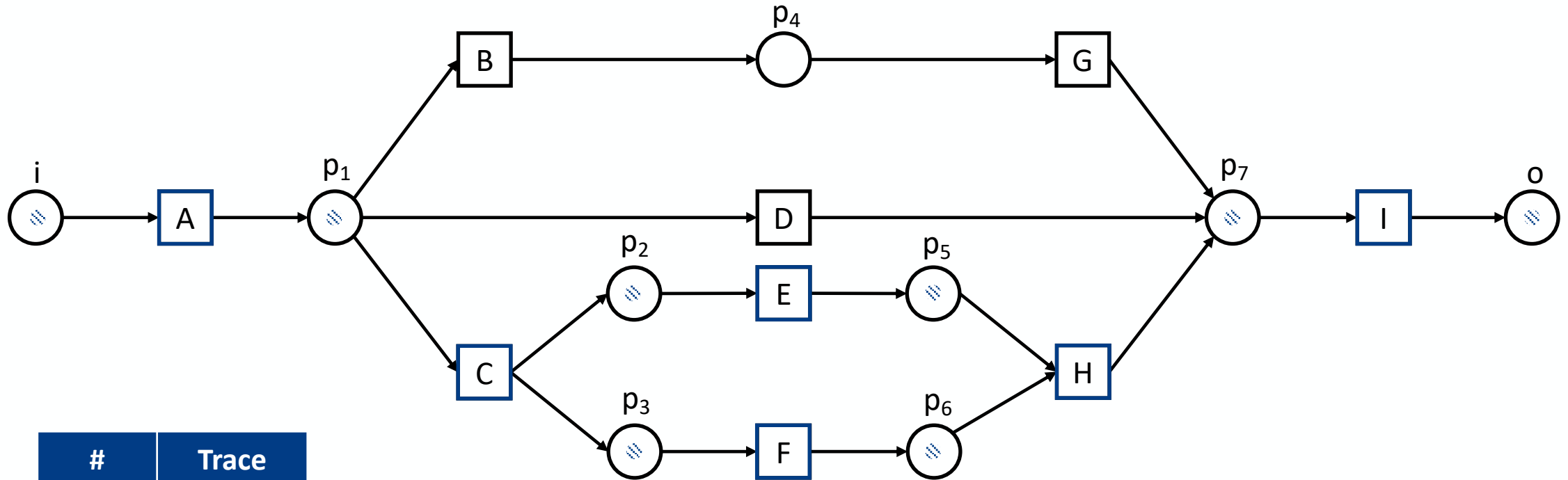
#	Trace
304	ADI
239	ACEFHI
130	ACEHI
43	ABGI
29	AI

m	0
r	0
c	4
p	4

$$Fitness_E(\sigma, N) = \frac{1}{2} \left(1 - \frac{m}{c} \right) + \frac{1}{2} \left(1 - \frac{r}{p} \right) = 1$$

Token Replay

Example



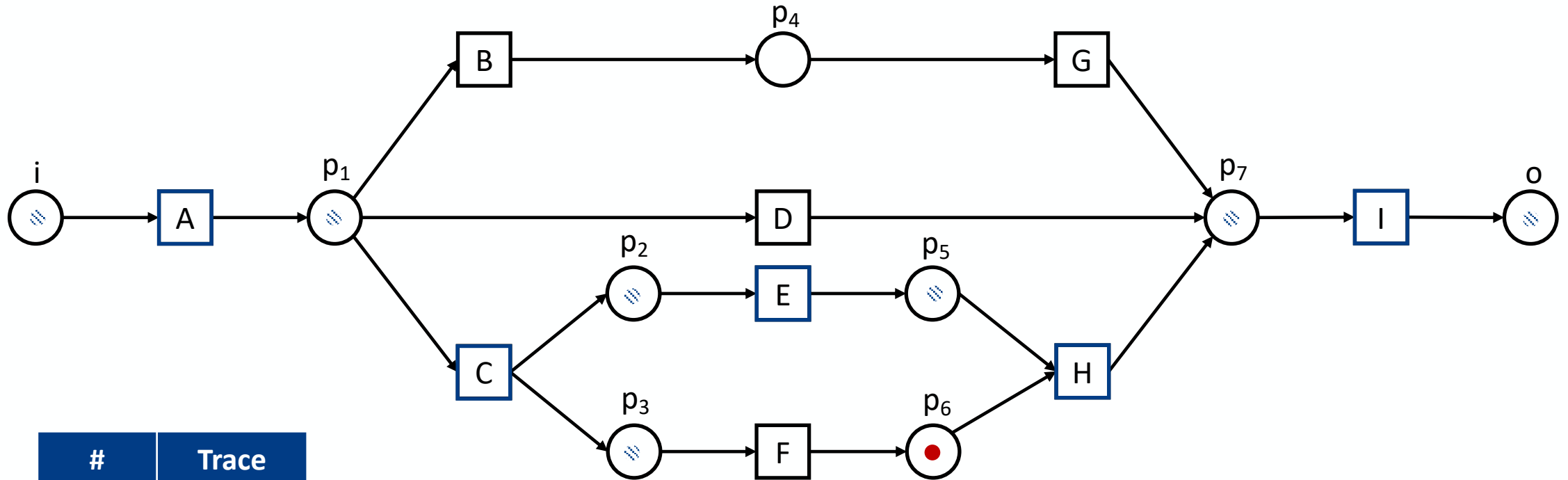
#	Trace
304	ADI
239	ACEFHI
130	ACEHI
43	ABGI
29	AI

m	0
r	0
c	8
p	8

$$Fitness_E(\sigma, N) = \frac{1}{2} \left(1 - \frac{m}{c} \right) + \frac{1}{2} \left(1 - \frac{r}{p} \right) = 1$$

Token Replay

Example



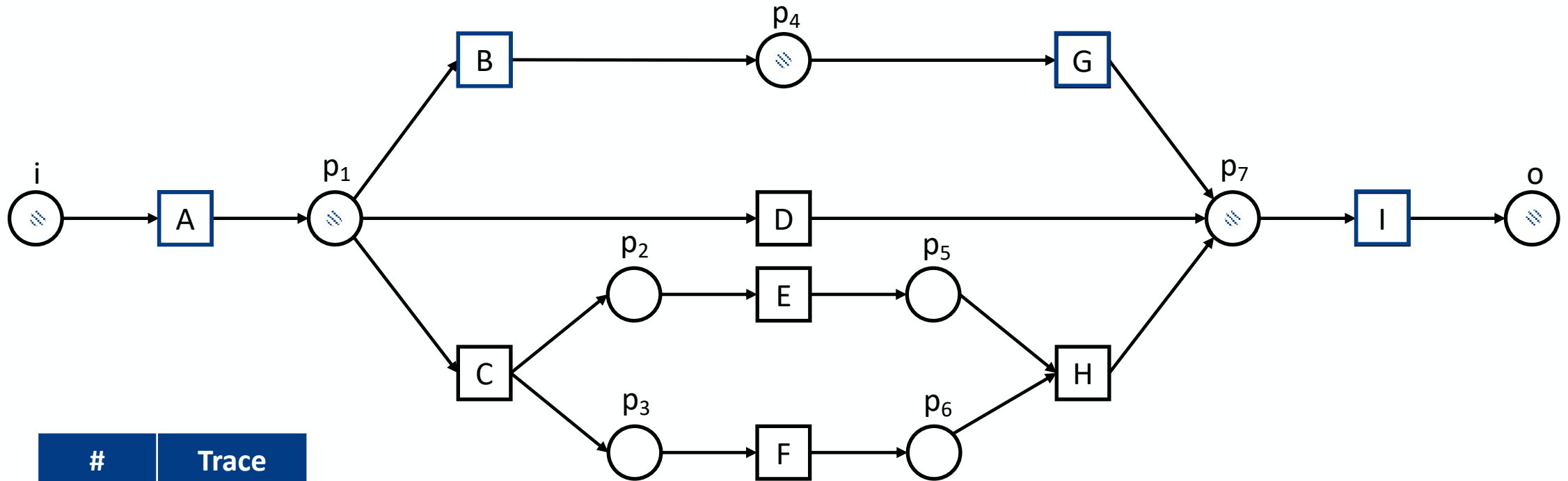
#	Trace
304	ADI
239	ACEFHI
130	ACEHI
43	ABGI
29	AI

m	1
r	1
c	7
p	7

$$Fitness_E(\sigma, N) = \frac{1}{2} \left(1 - \frac{m}{c} \right) + \frac{1}{2} \left(1 - \frac{r}{p} \right) = 0.8571$$

Token Replay

Example



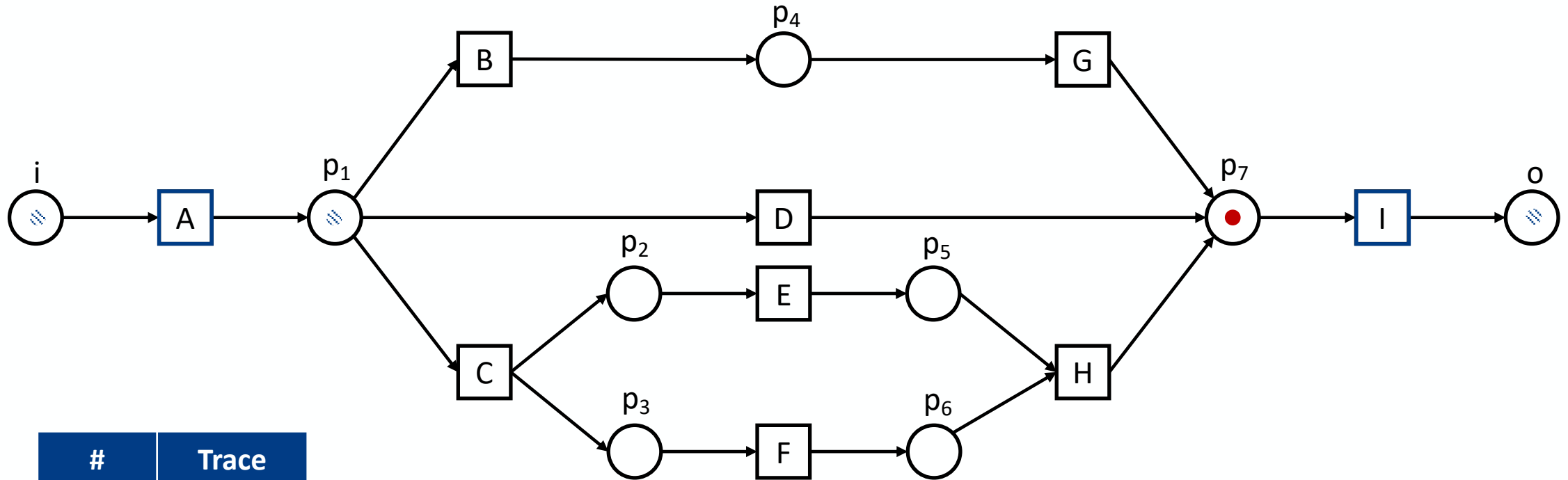
#	Trace
304	ADI
239	ACEFHI
130	ACEHI
43	ABGI
29	AI

m	0
r	0
c	5
p	5

$$Fitness_E(\sigma, N) = \frac{1}{2} \left(1 - \frac{m}{c} \right) + \frac{1}{2} \left(1 - \frac{r}{p} \right) = 1$$

Token Replay

Example



#	Trace
304	ADI
239	ACEFHI
130	ACEHI
43	ABGI
29	AI

m	1
r	1
c	3
p	3

$$Fitness_E(\sigma, N) = \frac{1}{2} \left(1 - \frac{m}{c} \right) + \frac{1}{2} \left(1 - \frac{r}{p} \right) = 0.6667$$

Token Replay

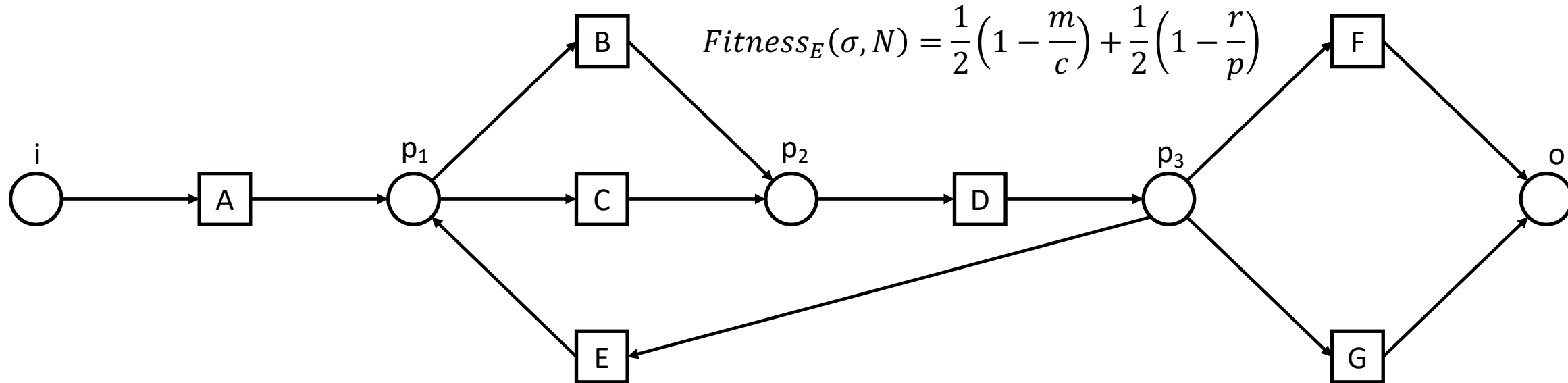
Example

#	Trace	m	r	c	p	Fitness
304	ADI	0	0	4	4	1
239	ACEFHI	0	0	8	8	1
130	ACEHI	1	1	7	7	0.8751
43	ABGI	0	0	5	5	1
29	AI	1	1	3	3	0.6667

$$\begin{aligned} \text{Fitness}_E(L, N) &= \frac{1}{2} \left(1 - \frac{\sum_{\sigma \in L} L(\sigma) \times m_{N, \sigma}}{\sum_{\sigma \in L} L(\sigma) \times c_{N, \sigma}} \right) + \frac{1}{2} \left(1 - \frac{\sum_{\sigma \in L} L(\sigma) \times r_{N, \sigma}}{\sum_{\sigma \in L} L(\sigma) \times p_{N, \sigma}} \right) \\ &= \frac{1}{2} \left(1 - \frac{304 \times 0 + 239 \times 0 + 130 \times 1 + 43 \times 0 + 29 \times 1}{304 \times 4 + 239 \times 8 + 130 \times 7 + 43 \times 5 + 29 \times 3} \right) + \frac{1}{2} (\dots) \approx 0.9634 \end{aligned}$$

Token Replay

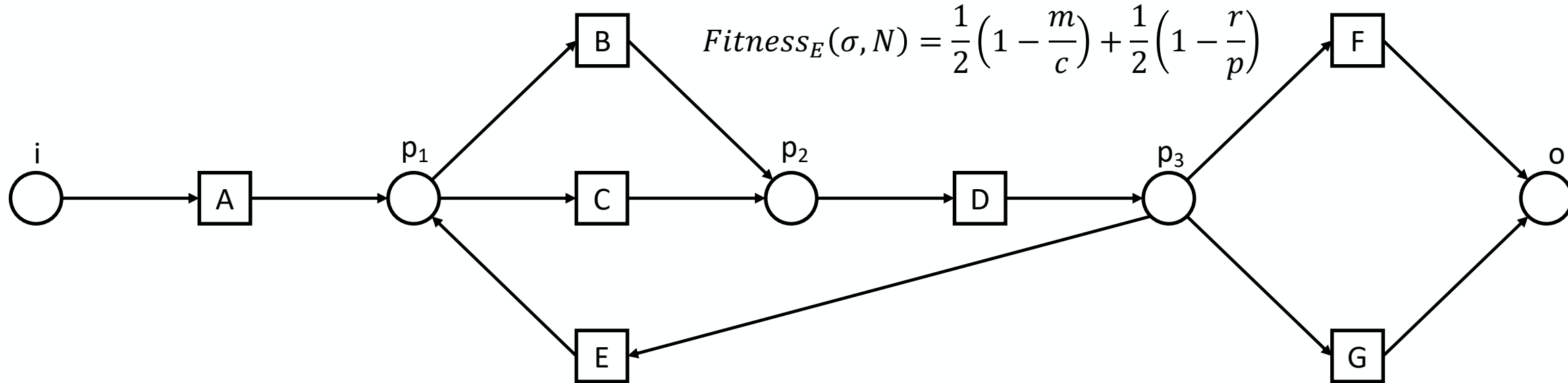
Exercise 1



#	Trace	p	c	m	r	$Fitness_F(\sigma, N)$
200	ACDF					
177	ADCEG					
56	AFG					
22	FDCA					

Token Replay

Exercise 1



#	Trace	p	c	m	r	$Fitness_F(\sigma, N)$
200	ACDF	5	5	0	0	1
177	ADCEG	6	6	2	2	$2/3$
56	AFG	4	4	2	2	$1/2$
22	FDCA	5	5	3	3	$2/5$

$$\begin{aligned}
 Fitness_E(L, N) &= \\
 &= \frac{1}{2} \left(1 - \frac{\sum_{\sigma \in L} L(\sigma) \times m_{N, \sigma}}{\sum_{\sigma \in L} L(\sigma) \times c_{N, \sigma}} \right) + \frac{1}{2} \left(1 - \frac{\sum_{\sigma \in L} L(\sigma) \times r_{N, \sigma}}{\sum_{\sigma \in L} L(\sigma) \times p_{N, \sigma}} \right) \\
 &= \frac{1}{2} \left(1 - \frac{532}{2396} \right) + \frac{1}{2} \left(1 - \frac{532}{2396} \right) = 0.7780
 \end{aligned}$$

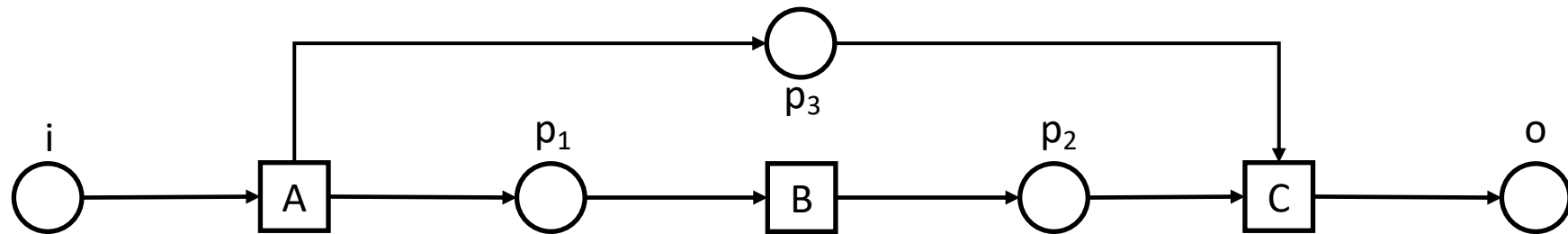
Token Replay reversed

Exercise 2a

Is the following combination of p, c, m and r possible?

If so, create a workflow net and a trace that satisfy the following combinations:

$$p \neq c \wedge c \neq m \wedge m \neq r \wedge p \neq r \wedge p \neq m \wedge c \neq r$$



Trace	p	c	m	r
BC	3	4	2	1

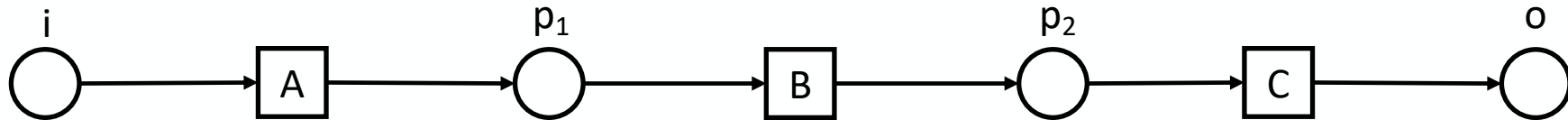
Token Replay reversed

Exercise 2b

Is the following combination of p , c , m and r possible?

If so, create a workflow net and a trace that will satisfy the combination in question.

$$p = c = m = r$$



Trace	p	c	m	r
B	2	2	2	2