1. Absense of shared Memory
   Absense of global clock.

2. $a \to b$ && $b \not\to a$

3. partial order - 3 properties

4. 3 events @ $S1$, 4th event at $S2$, 2 events $S1$ knows about $S3$.

5. graphical line
   past / future

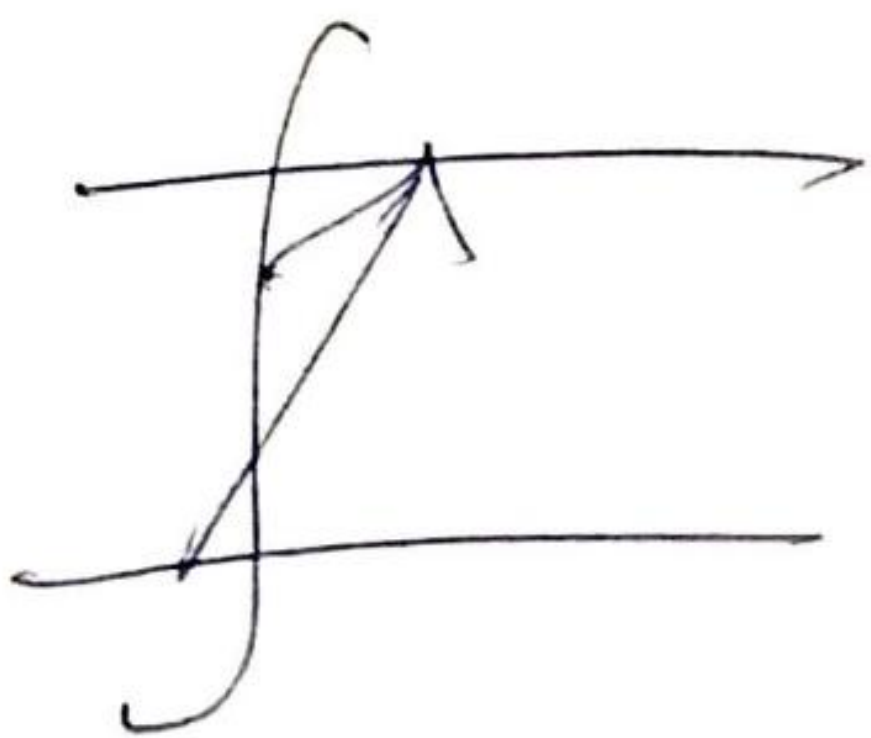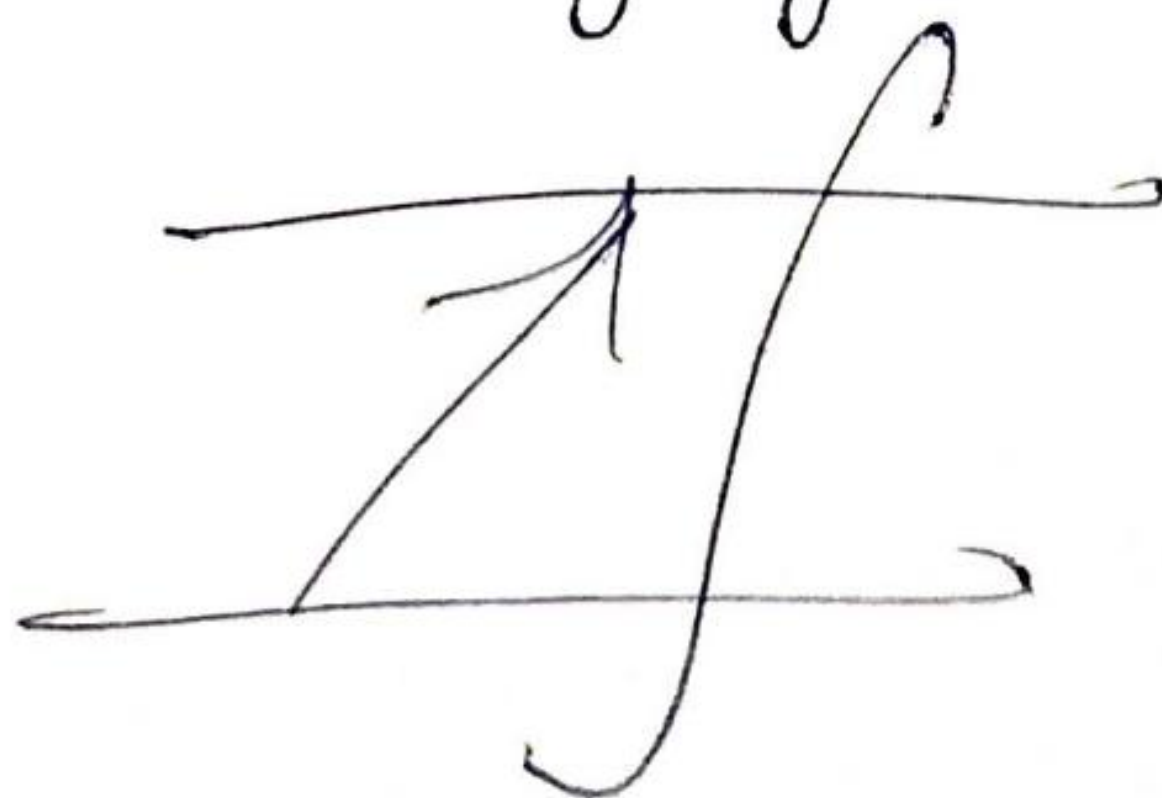6. strongly consistency is practically not possible. freezing and snapshotting affects performance.
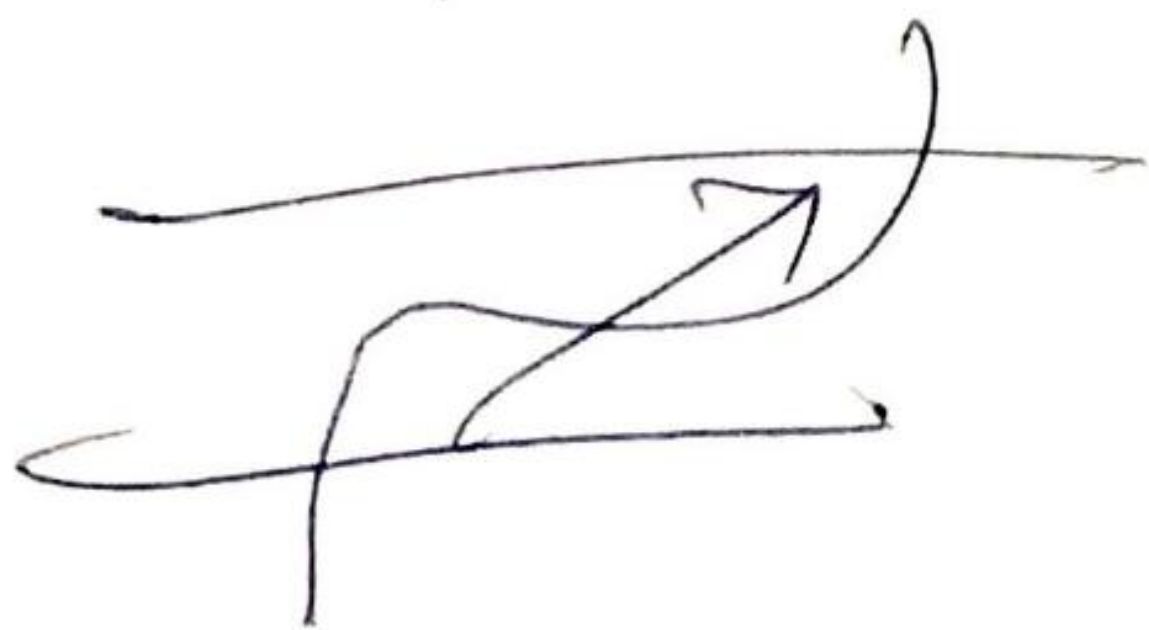
7. Time diff between two clocks.

$dc/dt > 1$

$= 1.$

$dc/dt < 1$
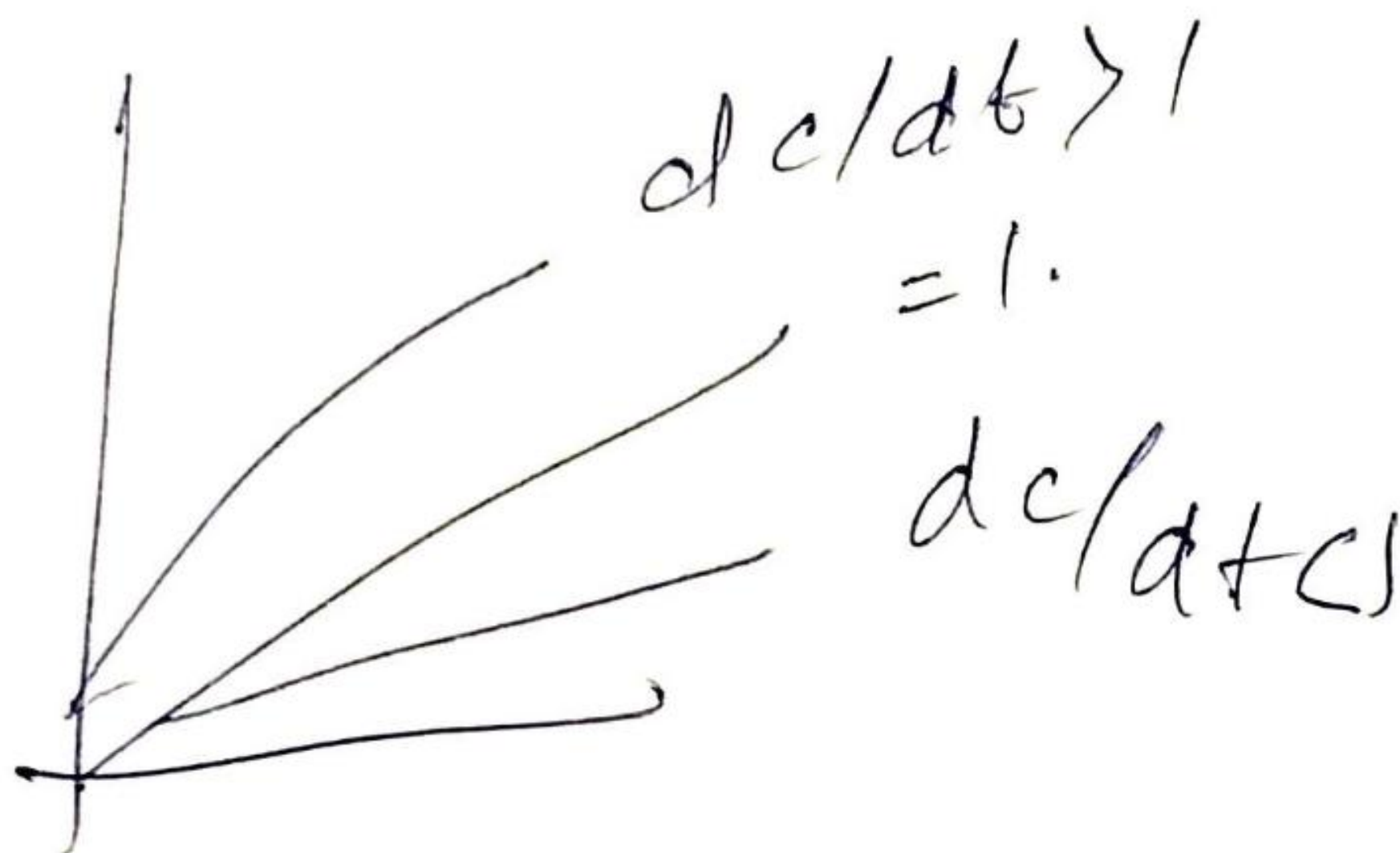
8. consistent   Strongly - consistent

inconsistent

9.

$(1,0,0)$ $(2,0,0)$ $(3,1,0)$ $(4,1,0)$

e_{11} e_{12} e_{13} e_{14}

S_1 1   2   3   4

$(0,1,0)$

S_2 e_{21} e_{22} $(4,2,0)$.

1   2 e_{33} e_{34} e_{35}

e_{31} e_{32} 3   4   5

S_3 $(0,0,1)$ $(0,0,2)$ $(2,0,3)$ $(2,0,4)$ $(2,0,5)$

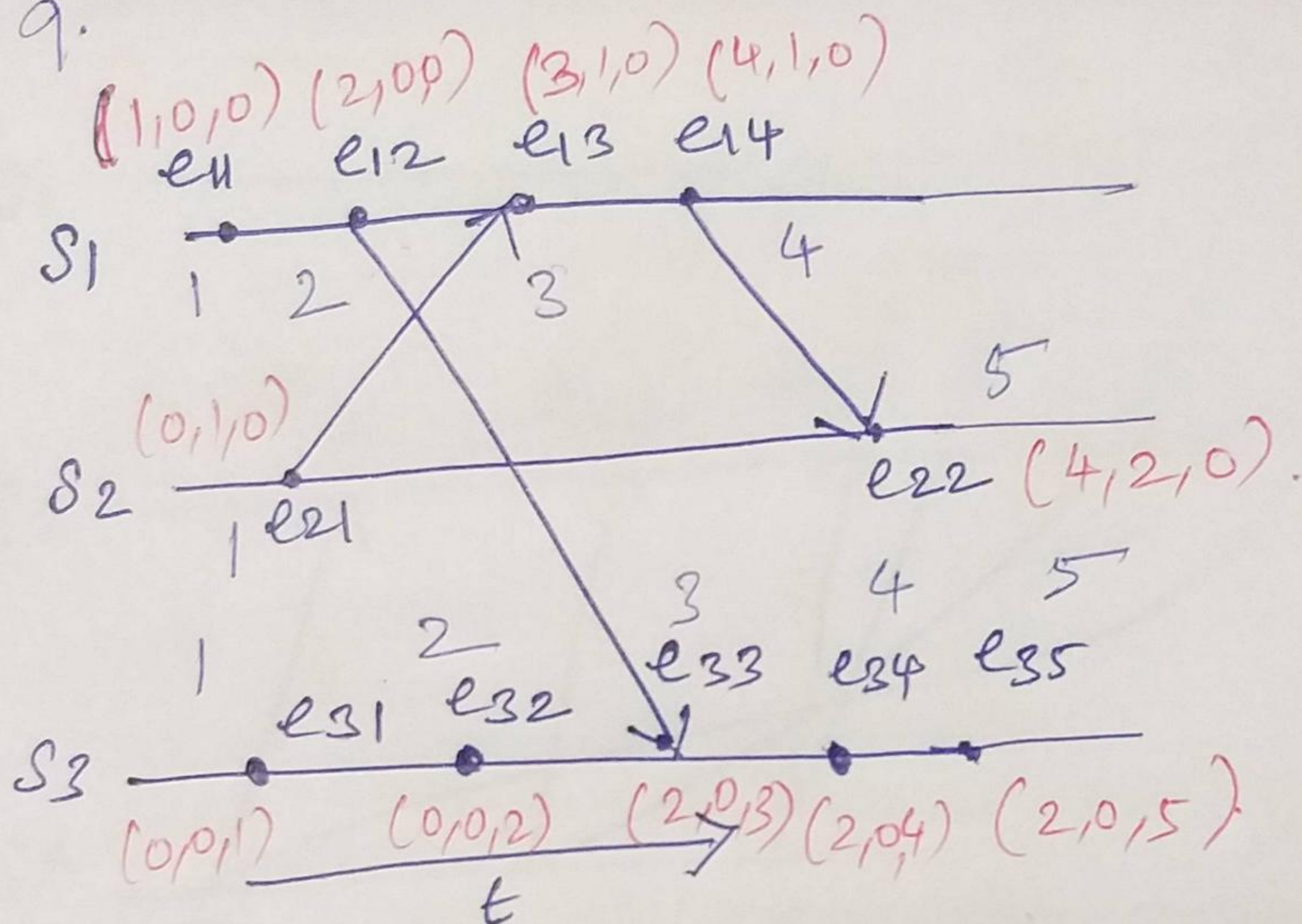t

red — vector clocks TS

Blue — Lampart's logic clock TS.

limitation proving events.

e_{13}, e_{33}.

$(3,1,0)$ $(2,0,3)$

$2 < 3$

$1 > 0$.

Broadcast ~~10~~ BSS Protocol

c	b	c

Deliver b then c

S_1 ————————————— e_{11} —— e_{12} —— e_{13}

$(0,0,3)$ $(0,0,2)$ $(0,0,1)$

$(0,0,1)$ $(0,0,2)$ $(0,0,3)$

e_{21} e_{22} e_{23}

S_2 ————————————————————————

a b c

S_3 ————————————————————————

e_{31} e_{32} e_{33} $(0,0,3)$

$(0,0,1)$ $(0,0,2)$

t.
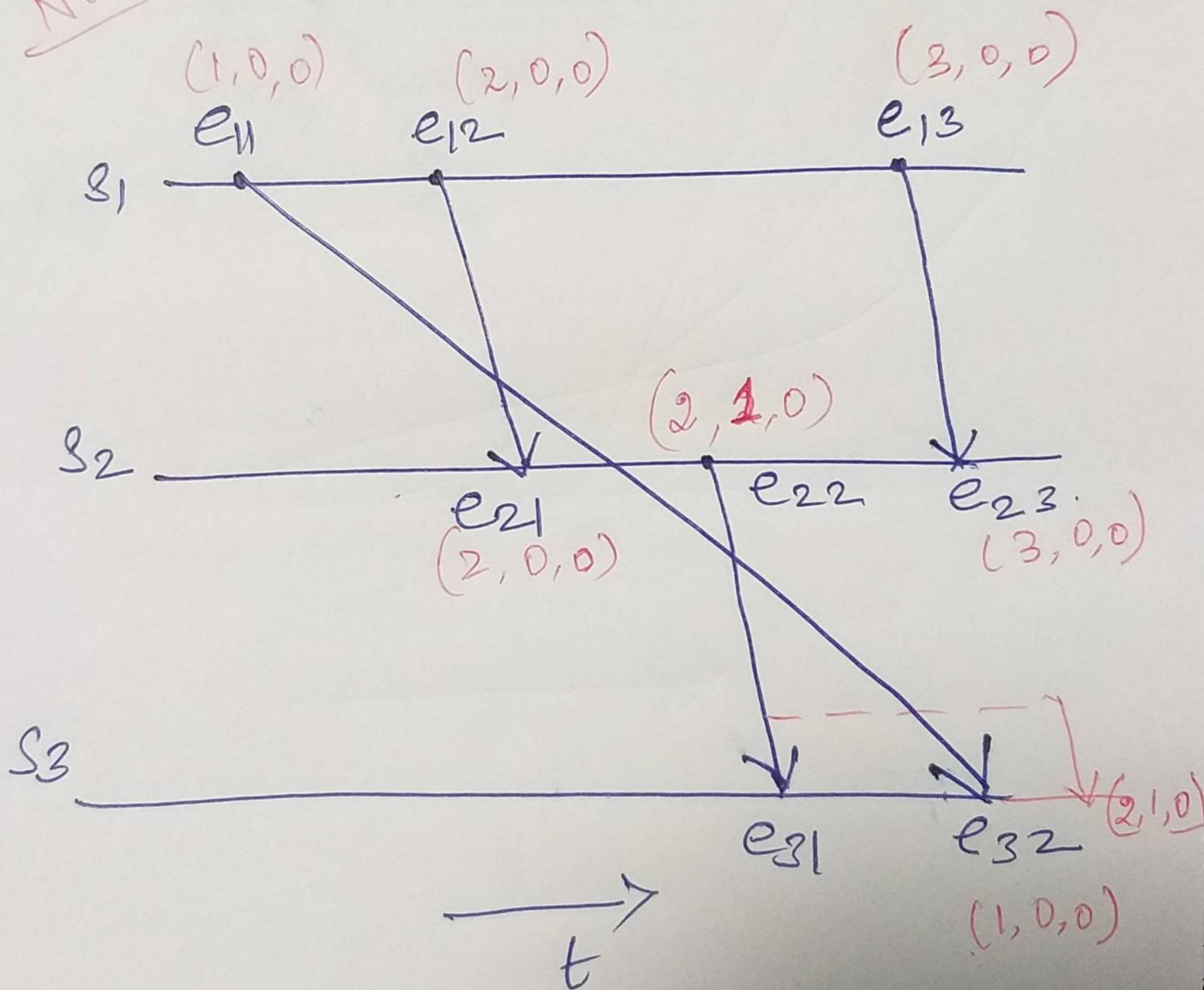
Non-Broadcast

SES Protocol

$(1,0,0)$ $(2,0,0)$ $(3,0,0)$

e_{11} e_{12} e_{13}

S_1

S_2

$(2,1,0)$

e_{21} e_{22} e_{23}

$(2,0,0)$ $(3,0,0)$

S_3

e_{31} e_{32} $(2,1,0)$

$(1,0,0)$

t

Scanned by TapScanner

(13)

S_1 e_{11} e_{12}

04

03

2   2

01   5   06

S_2 e_{21} (a) e_{22}
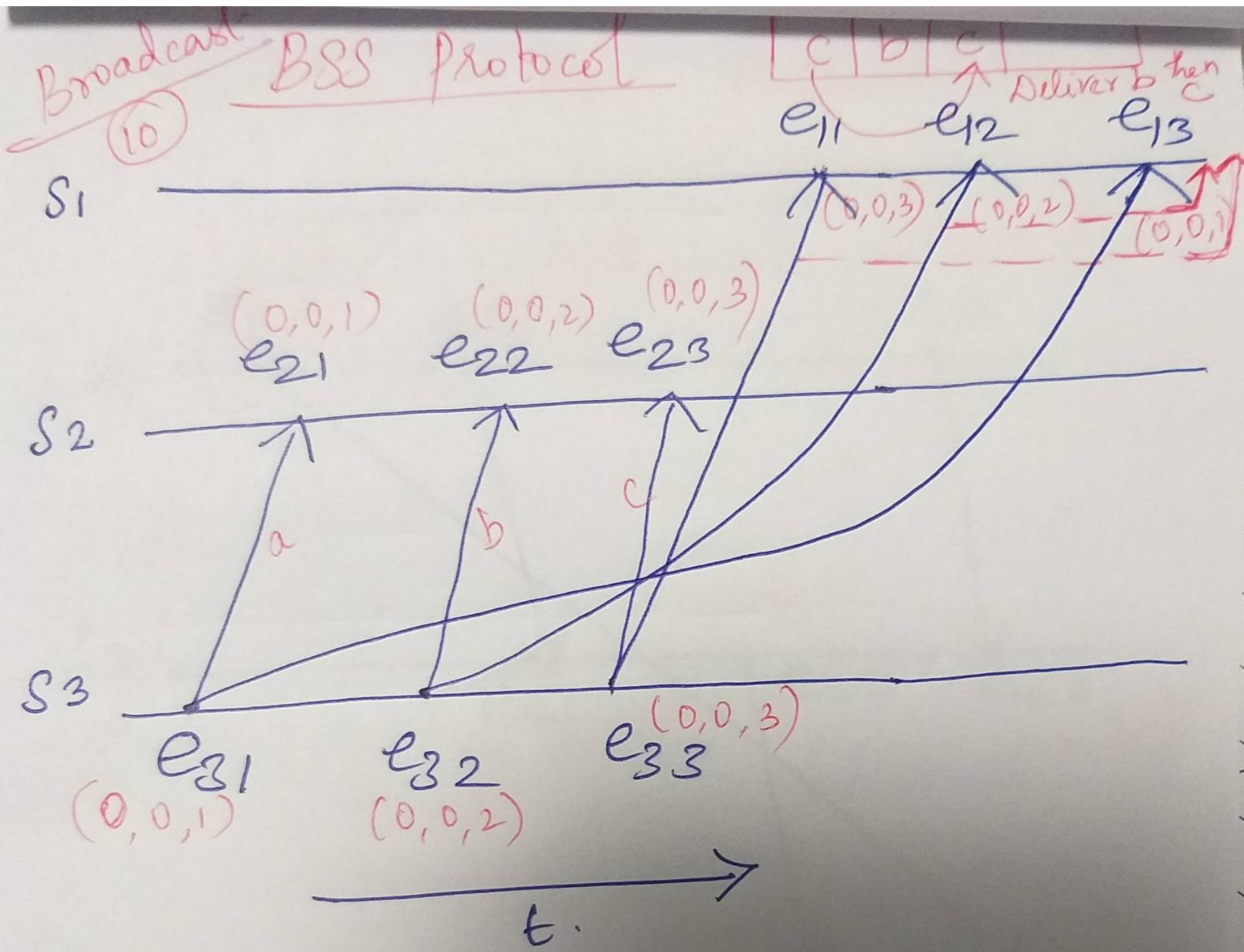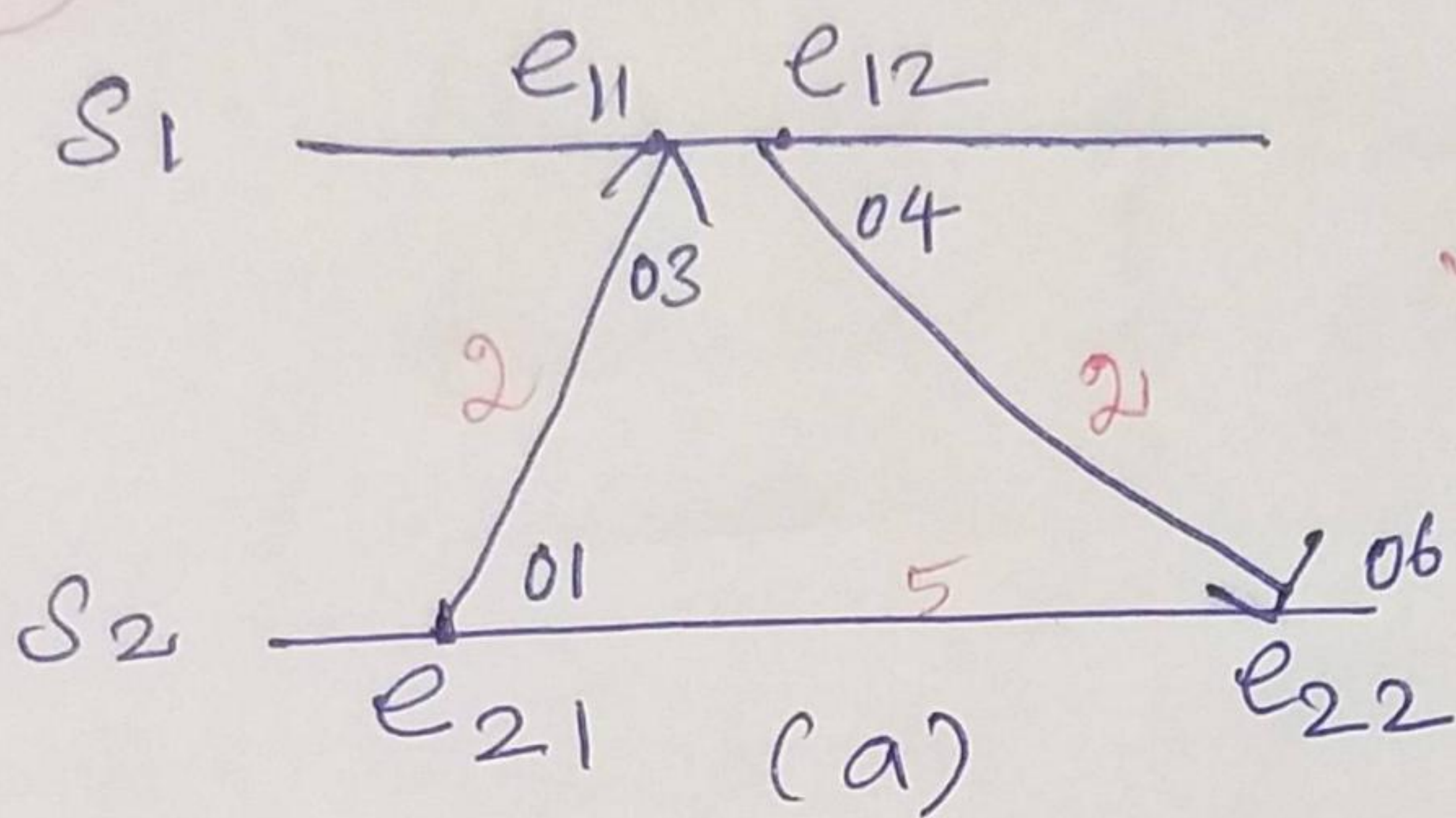
(a) leads to
closer /
Approximate
Synchronization
Compared to
(b) & (c)

S_1 e_{11} e_{12}

04

03

2   4

08

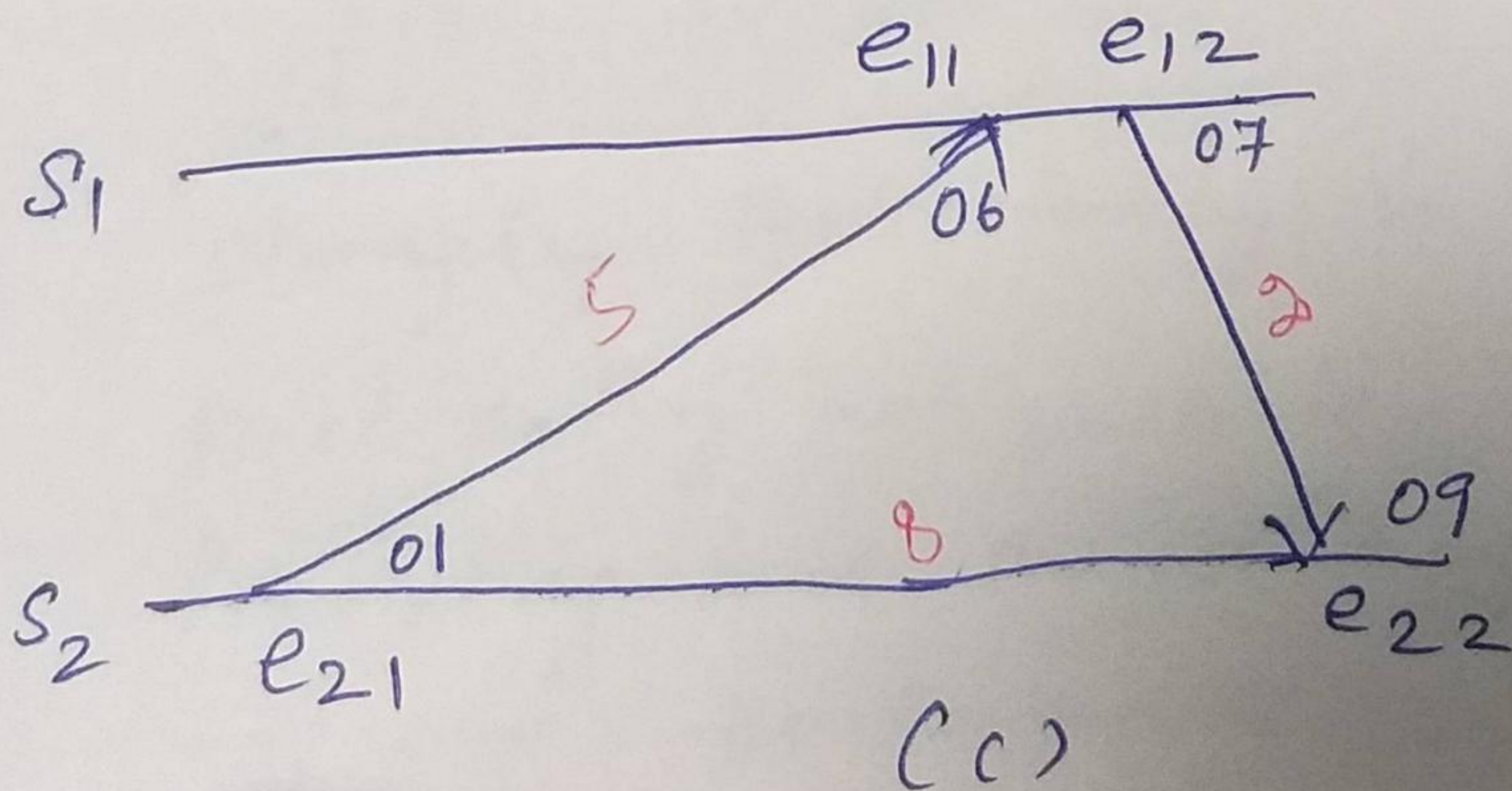7 e_{22}

S_2 e_{21} (b)

01

S_1 e_{11} e_{12}

07

06

5   2

01   8   09

S_2 e_{21} e_{22}

(c)

(12)

C12

P1   P2

C21

C31

C13   C32

C23

P3
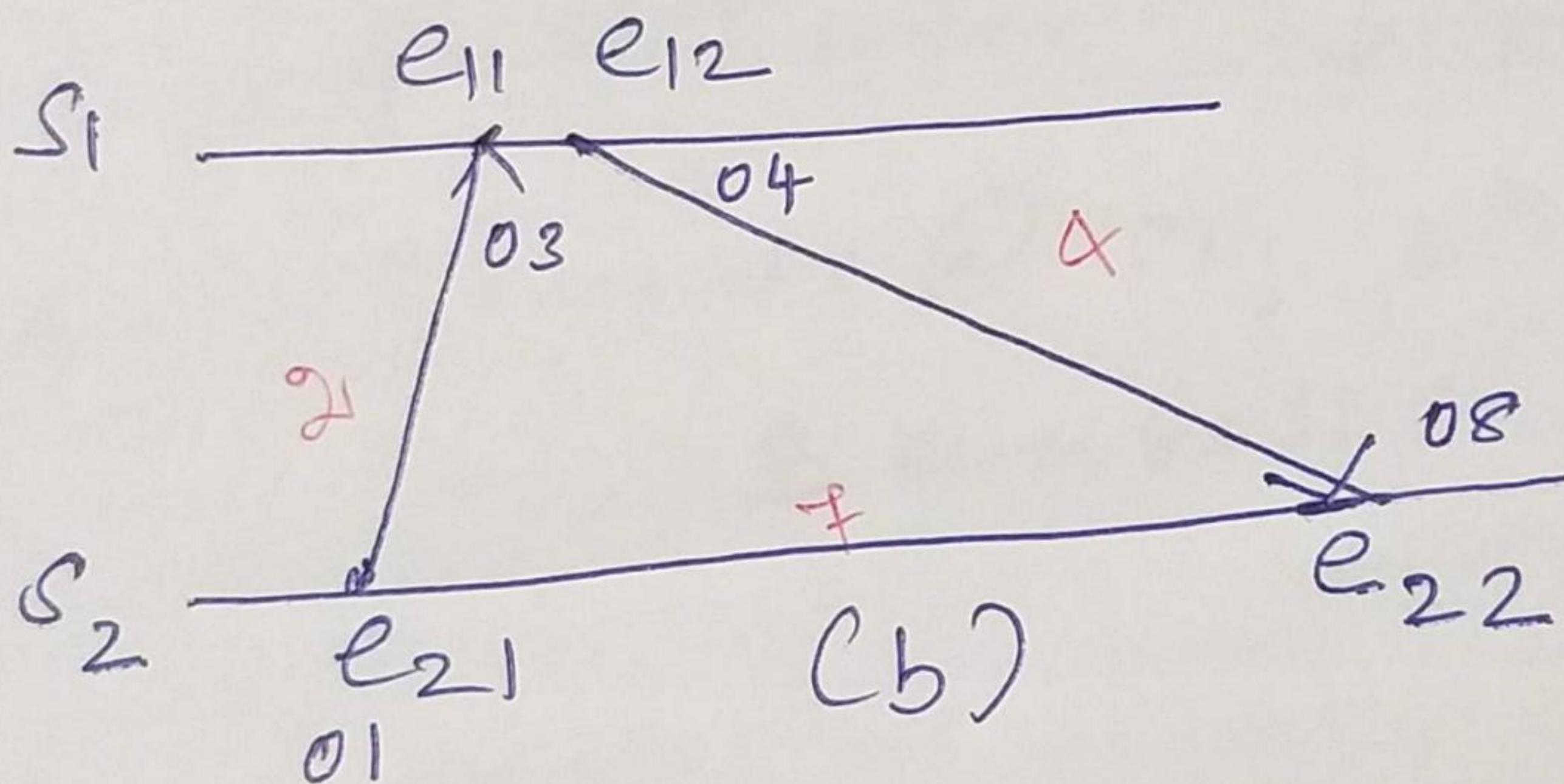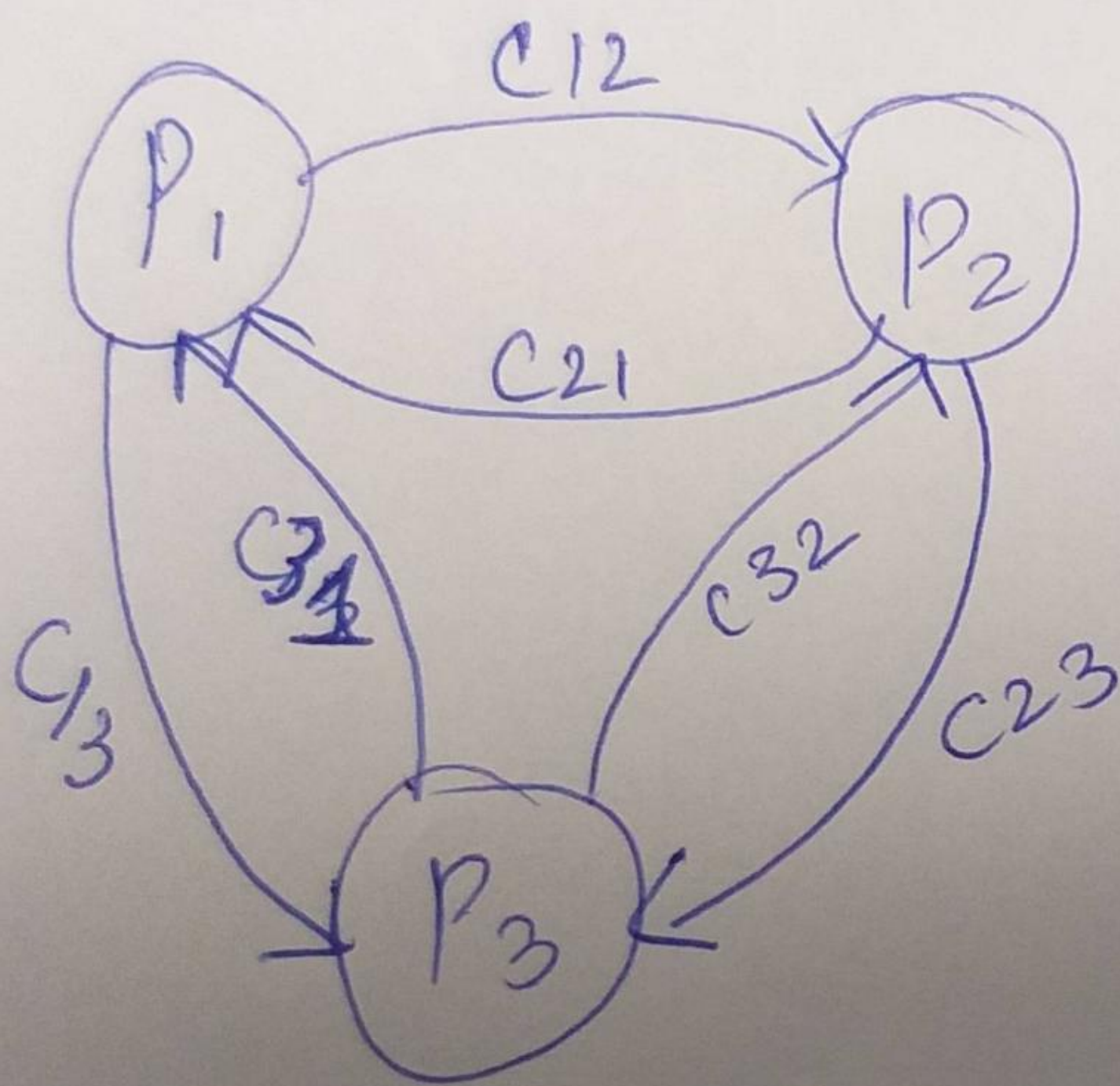
Marker Sending
&
Marker Receiving
Rule
Steps.

F

(13)

(a)

S_1 — e_{11} — T_2 1 — T_3 e_{12}

$T_{new} = T_{ser} + \dfrac{(T_2-1)(T_4-T_3)}{2}$

$T_{new} = T_s + (T_4 - T_1) - (T_3 - T_2)^2$

$T_n = 4 + (4)$

$\boxed{T_n = 8}$

S_2 T_1 e_{21} 5   (a) e_{22} T_4

03   04   2   01   06

$T = 4 + \dfrac{2+2}{2}$
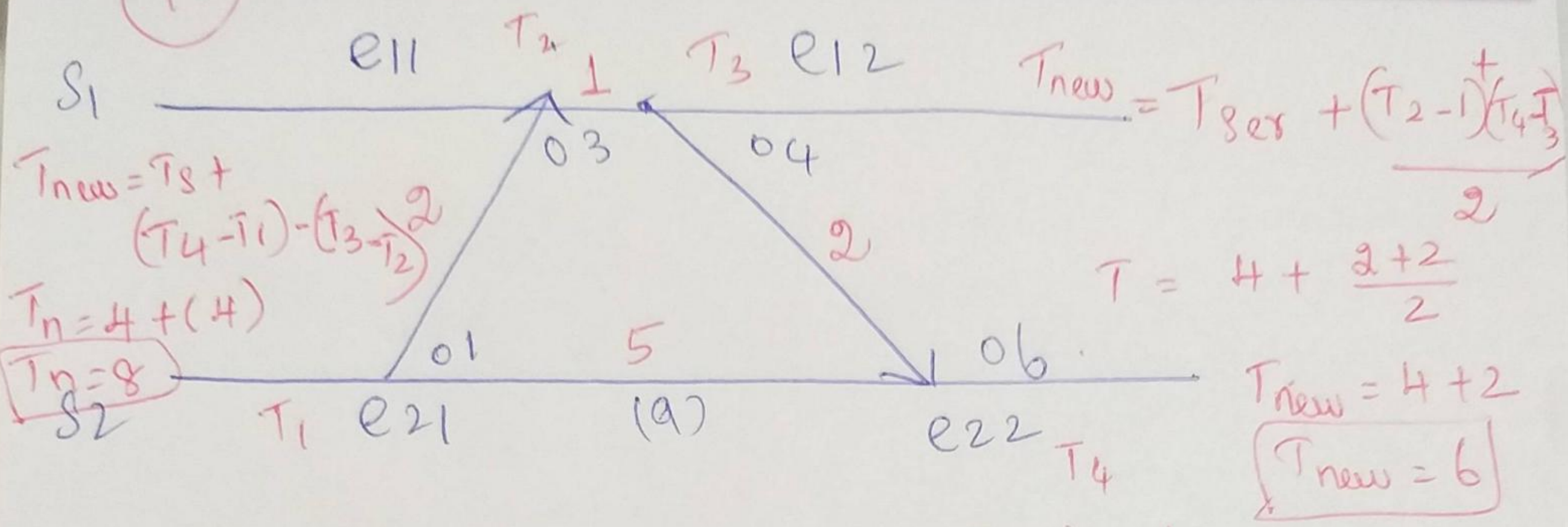
$T_{new} = 4 + 2$

$\boxed{T_{new} = 6}$

a → leads to closer
Approximate Time

(b)

S_1 e_{11} 1 e_{12}

$T_n = 4 + 6$
$\boxed{T_n = 10}$

S_2 03 04 2 01 7 (b)   4   08

e_{21} e_{22}

$T_{new} = 4 + \dfrac{2+4}{2}$

$T_{new} = 4 + 3$

$\boxed{T_{new} = 7}$

(c)

S_1 e_{11} 1 e_{12}

$T_n = 7 + 7$
$\boxed{T_n = 14}$

S_2 05 06 07 2 08 09

e_{21} 01 (c) e_{22} 10

$T_{new} = 7 + \dfrac{5+2}{2}$

$= 7 + 3.5$

$\boxed{T_{new} = 10.5}$