d[10|5|7|20|8]

A B C D

10×5 5×7 7×20 20×8

ضرب زنجیره ای ماتریس ها

(AB) (CD) → 10×5×7 + 7×20×8

AB 10×7

CD 7×8

مرتبه: 2016

10×7×8

(A(BC))D

BC 5×20

: 3300

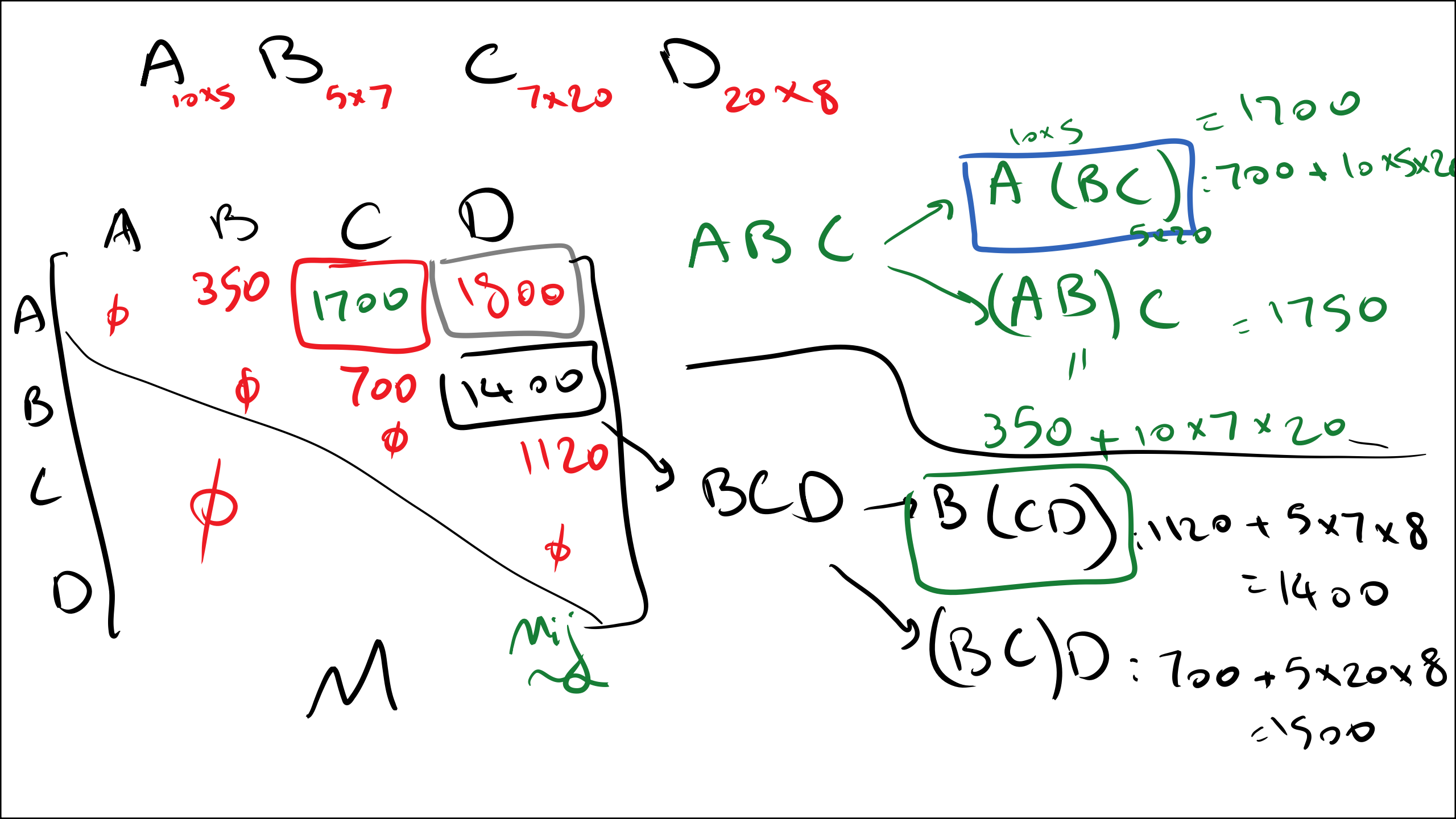
5×7×20

+10×5×20

+10×20×8

عدد کاتالان

$\frac{1}{n}\binom{2(n-1)}{n-1}$


A 10×5
B 5×7
C 7×20
D 20×8
A
B
C
D
A
B
C
D
0
350
1700
1800
0
700
1400
0
1120
0
Min
M
ABC
A(BC) : 700 + 10×5×20
= 1700
(AB)C = 1750
350 + 10×7×20
BCD
B(CD) : 1120 + 5×7×8
= 1400
(BC)D : 700 + 5×20×8
= 1500

ABCD

M14

A(B(CD)) : 1400 + 10×5×8 = 1800 ✓

(AB)(CD) = 350 + 1120 + 10×7×8 = 2030

(AB: 10×7, CD: 7×8)

(ABC)D = 1700 + 10×20×8 = 3300

(ABC: 10×20)

def MultMatrix ($d_{(n+1)}$ (ابعاد ماتریس ها)): n تعداد ماتریس

$M = Zeros(n,n)$ $T = Zeros(n,n)$

for $S=1$ to $n-1$:

for $i=1$ to $n-S$:

$j = i+S$

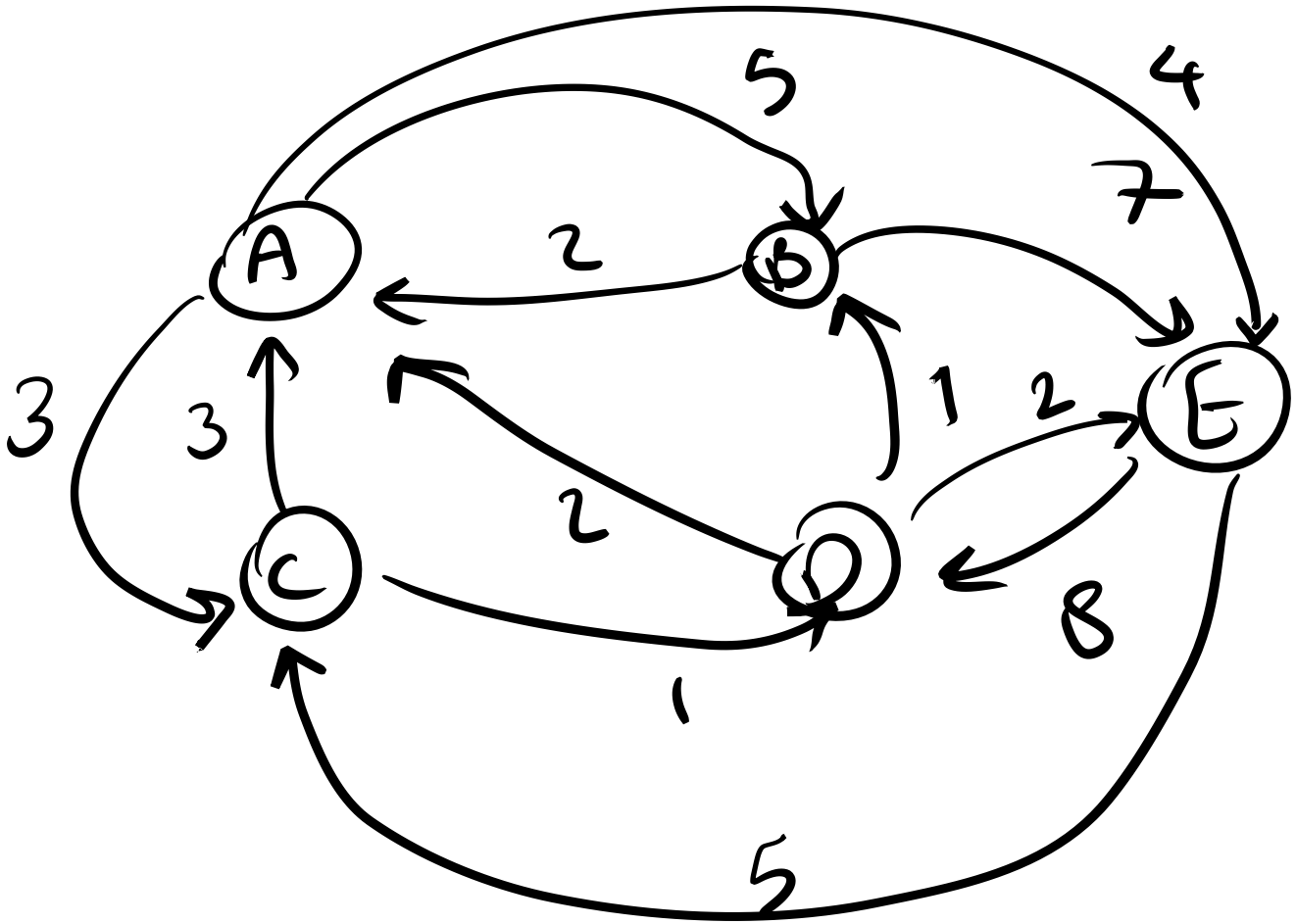
$M_{ij} = \min_{k: i \to j-1} (M_{ik} + M_{k+1,j} + d_{i-1} \times d_k \times d_j)$

$T_{ij} = k$

$\sum_{S=1}^{n-1} \sum_{i=1}^{n-S} \sum_{k=i}^{j-1} O$ $(j = i+S)$

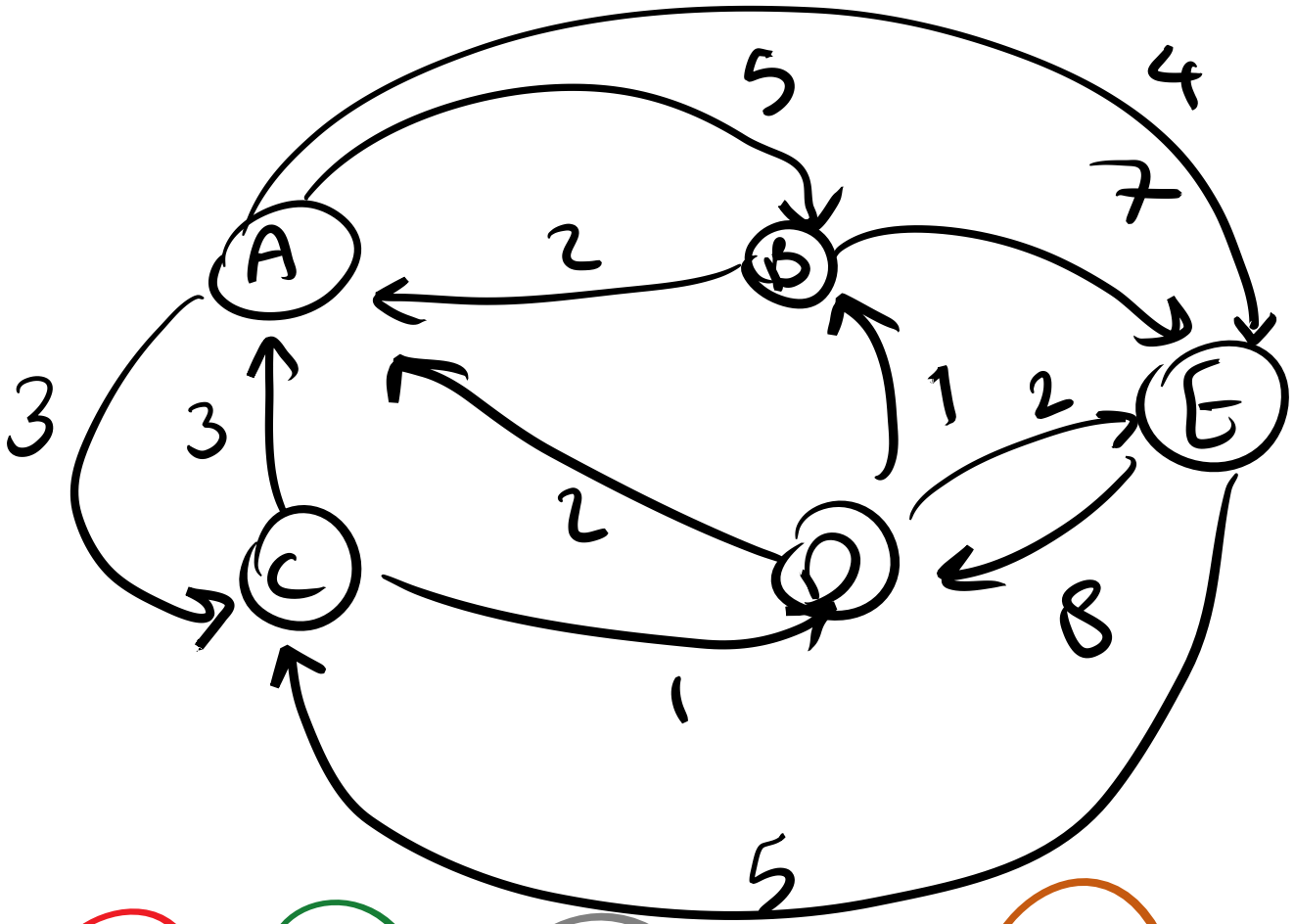
$O(n^3)$

$O(n^2)$ حلقه



الگوریتم فلوید-وارشال

	A	B	C	D	E
A	0	5	3	∞	4
B	2	0	∞	∞	7
C	3	∞	0	1	∞
D	2	1	∞	0	2
E	∞	∞	5	8	0



الگوریتم فلوید - وارشال

۸ رؤس

	A	B	C	D	E
A	0	5	3	~~4~~ ∞	4
B	2	0	~~5~~ ∞	~~6~~ ∞	~~7~~ 6
C	3	~~∞~~ 8	0	1	~~∞~~ 7
D	2	1	~~5~~ ∞	0	2
E	~~∞~~ 8	∞ 7	5	~~8~~ 6	0

3

```
def floyd(M):
    for k=1 to n:
        for i=1 to n:
            for j=1 to n:
                if M[i,k] + M[k,j] < M[i,j]
                    M[i,j] = M[i,k] + M[k,j]
```

$O(n^3)$: زمان

$O(n^2)$: حافظه

A → E :

A → B → C → E

X دومه