DP - Part VII

Complete Course on Algorithm for GATE - CS & IT

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Partition - Algo

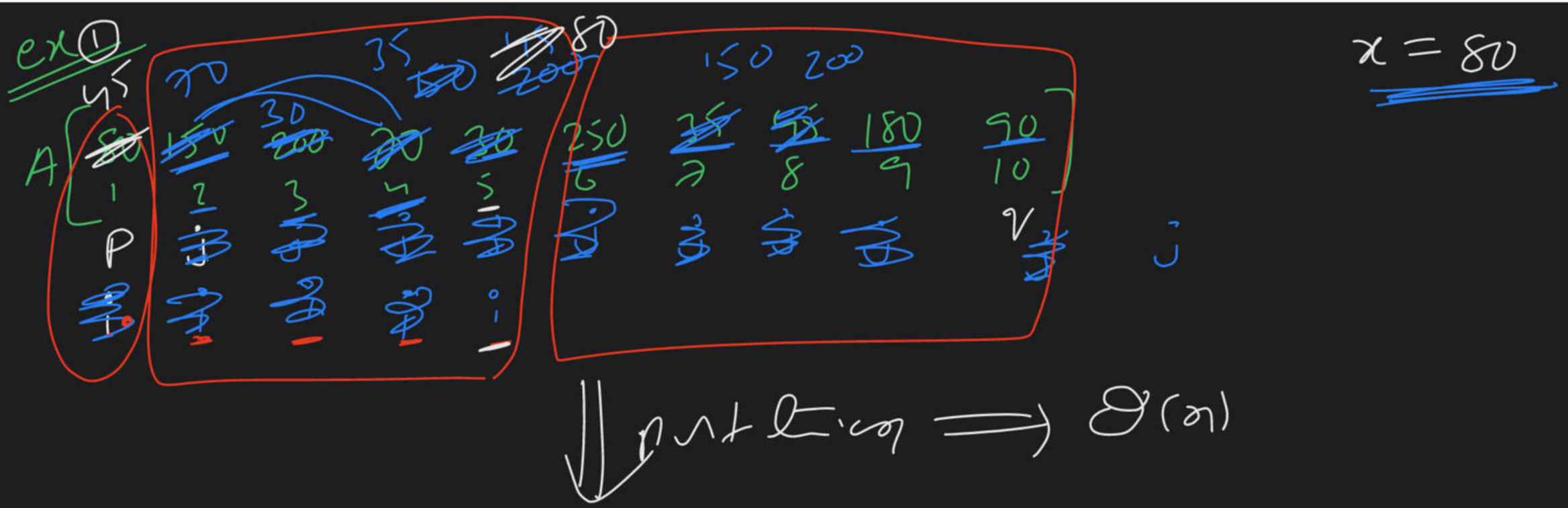
$n-1 \Rightarrow \theta(n)$

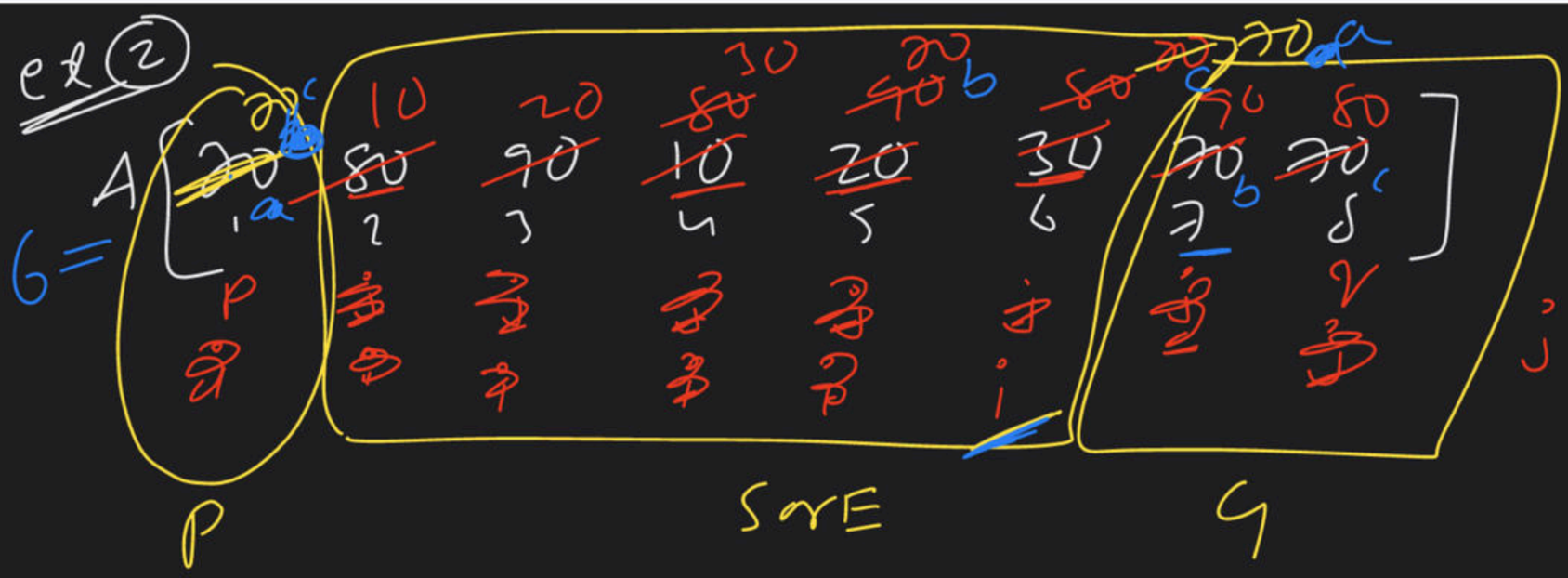
Partition(a, p, q) (p = 1, q = 10)

Pivot element

```
x = a[p];
i = p;
for(j = p+1; j <= q; j++)
{
    if(a[j] <= x)        // a[j] = 150, x = 80
    {
        i = i+1;
        swap(a[i], a[j]);
    }
}
swap(a[p], a[i]);
return(i);
```

$n-1$


ex ①
$x = 80$
partition $\Longrightarrow \Theta(n)$
$5 = (45\ 20\ 30\ 35)\ 80\ (250\ 150\ 200\ 180\ 90)$
$1\ \ 2\ \ 3\ \ 4 \qquad 5 \qquad 6\ \ 7\ \ 8\ \ 9\ \ 10$



$\Downarrow$ partition $\Longrightarrow \Theta(n)$

$A = (70_c \;\; 10 \;\; 20 \;\; 30 \;\; 70_b) \;\; 70_a \;\; (90 \;\; 80)$

$(1 \;\; 2 \;\; 3 \;\; 4 \;\; 5) \;\; 6 \;\; (7 \;\; 8)$

$\Downarrow \qquad \checkmark \qquad \Downarrow$

$(10 \;\; 20 \;\; 30 \;\; 70_c \;\; 70_b) \;\; 70_a \;\; (80 \;\; 90) \Longrightarrow$

ex (3)

$x = 80$

7 =

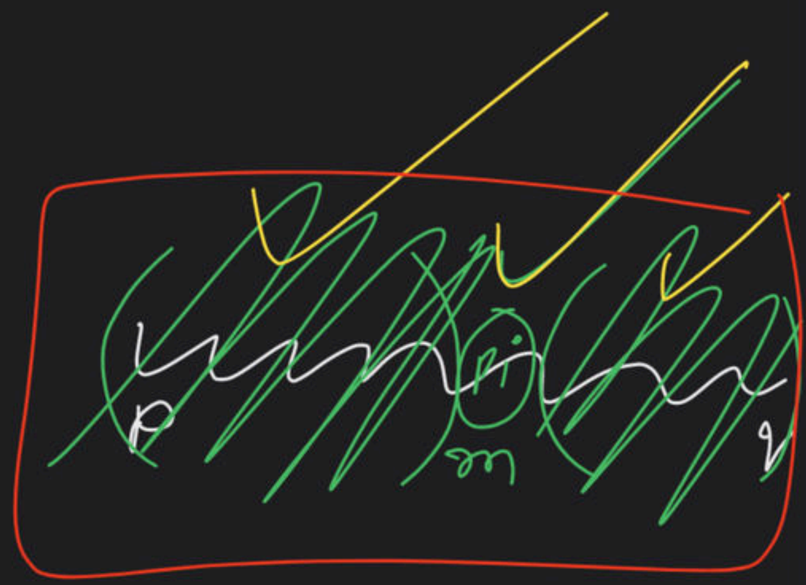
QS()

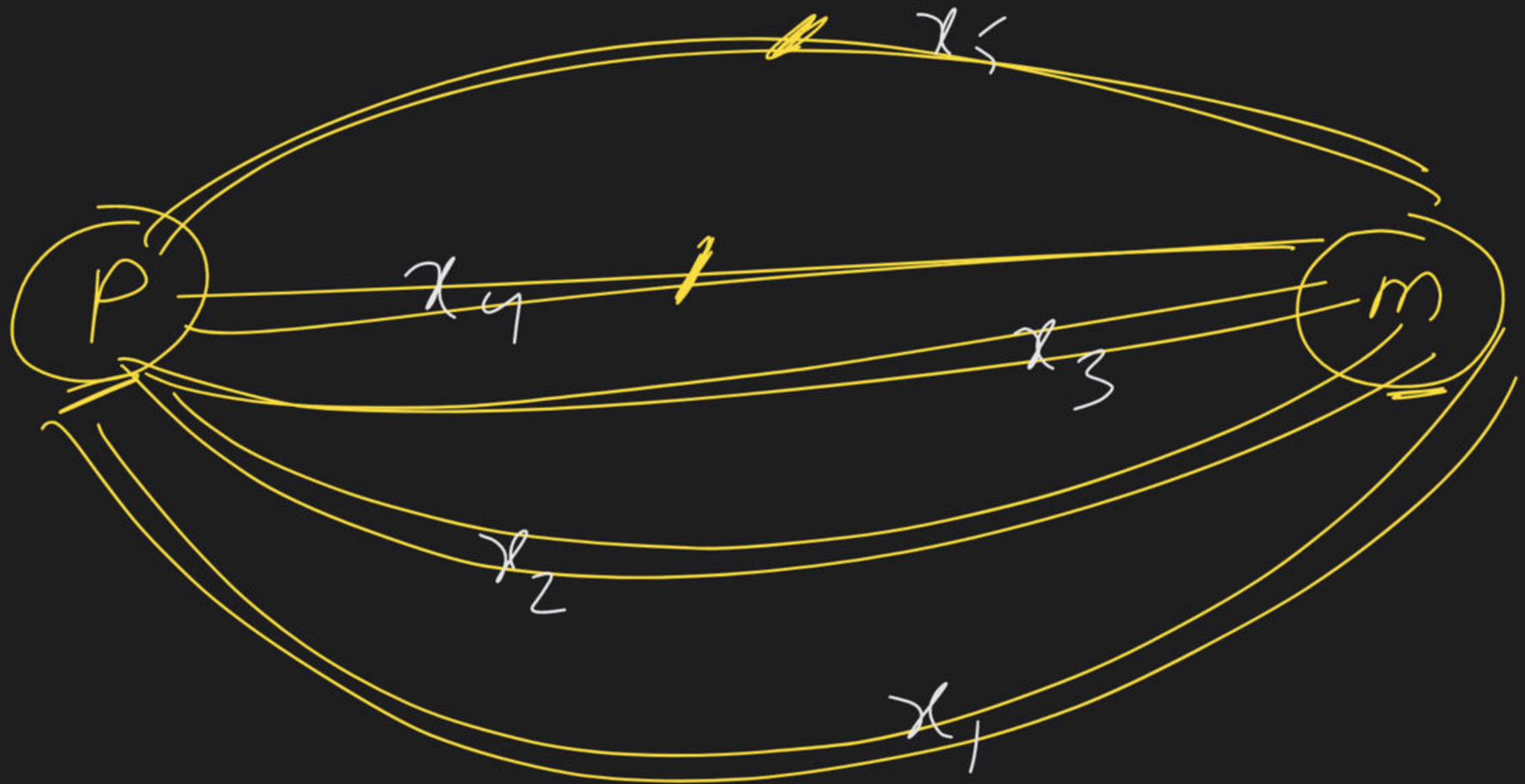
↓

partition $\Longrightarrow \theta(n)$

$$7 = \begin{pmatrix} 30 & 20 & 60 & 50 & 10 & 20 \\ 1 & 2 & 3 & 4 & 5 & 6 \end{pmatrix} \begin{matrix} 80 \\ 7 \end{matrix} \begin{pmatrix} 90 & 100 & 110 \\ 8 & 9 & 10 \end{pmatrix}$$

```
QS(a, p, r)
{
  if (p == r) return(a[p])
  else{
    m = Partition(a, p, r)
    . QS(a, p, m-1)
    . QS(a, m+1, r)
    return(a)
  }
}
```




p
m
x_5
x_4
x_3
x_2
x_1