$A = \text{abs}(\ )$

$\text{subtract}(l_i, \mu)$

$$\text{mean}(A, K) \quad \frac{\sum_{i=0}^{K-1} \left| \boxed{l_i - \boxed{\mu}} \right|}{K}$$

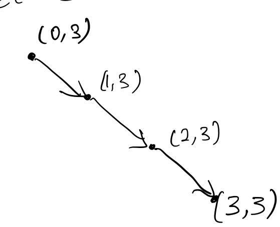
$\text{mean}(L, K)$

$\text{mean}(\text{abs}(\text{subtract}(L, \text{mean}(L))))$

$\text{mean}(A, K) = \text{mean}(A)$

3.2 a

$$\text{sum}(i,j) = \begin{cases} l_i & i=j \\ l_i + \text{sum}(i+1, j) & \text{else} \end{cases}$$



$$\begin{aligned} \text{sum}(0,3) &= l_0 + \boxed{\text{sum}(1,3)} \\ &= l_0 + l_1 + \boxed{\text{sum}(2,3)} \\ &= \quad \text{"} \quad + l_2 + \boxed{\text{sum}(3,3)} \\ &= \quad \text{"} \quad + l_3 \end{aligned}$$

idea is to take the first element out...

→ we can replace recursion ⇔ iteration.
← elegant. ← faster

$$\text{sum}(i,j) = \text{sum}(i, m-1) + l_m + \text{sum}(m+1, j)$$

← this solution is not any better! minimally we need to go through each element!

3.2 b Assume $j > 0$ ← If we want to be careful, we should also consider $i = 0$, $j = 0$, etc...

$$i^j = \begin{cases} i \times i^{j-1} & \text{otherwise} \\ i & j = 1 \\ \text{root}(i, j) & j < 1 \end{cases}$$

$i^j \rightarrow i^{j-1} \rightarrow \cdots \rightarrow$ Base Case.

Can we improve?

$$2^4 \longrightarrow 2^2 \times \boxed{2^2} \longrightarrow 2 \times \boxed{2}$$

$$2^{1024} = (2^{512})^2 \qquad (2^{256})^2 \qquad (2^{128})^2$$

$$1024 \longrightarrow 512 \longrightarrow 256 \longrightarrow 128 \rightarrow 64 \rightarrow 32 \rightarrow 16 \rightarrow 8 \rightarrow 4 \rightarrow 2$$

$O(\log_2(n))$

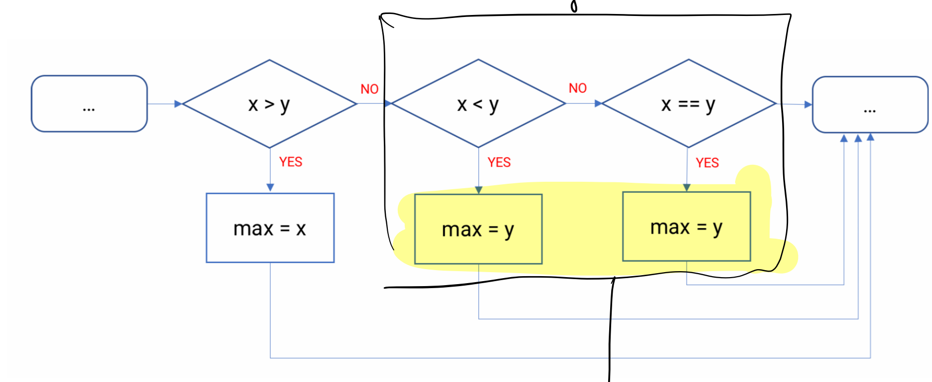
$$\underbrace{i^j = \left(\boxed{i^{j/2}}\right)^2}$$

only computing it once!

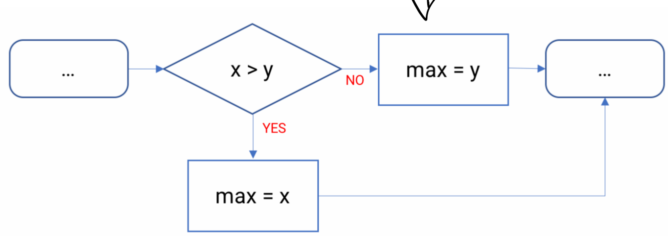
when we 'split' like this, you need to be very careful with the counting!

8.1a

merge.



8.1b

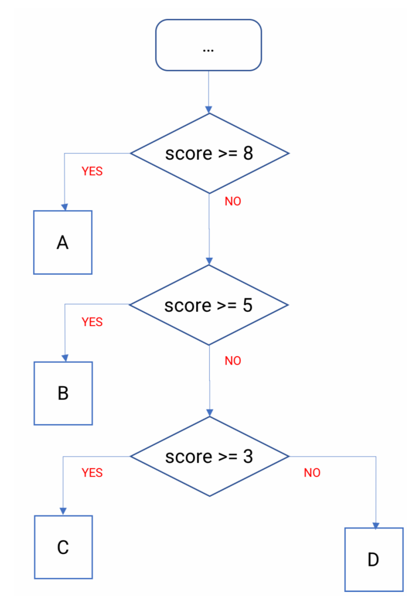


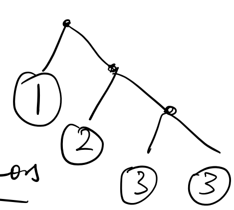
8.2

```
if (score >= 5) {
  // Table 3
  if (score >= 8) {
    // A
  } else {
    // B
  }
} else {
  // Table 4
  if (score >= 3) {
    // C
  } else {
    // D
  }
}
```

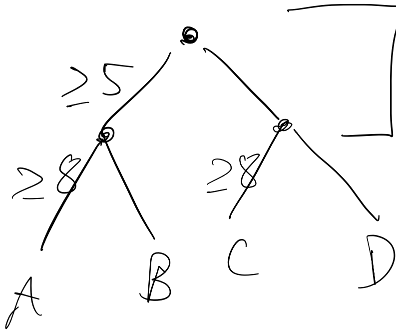
OR

```
if (score >= 8) {
  // A
} else if (score >= 5) {
  // B
} else if (score >= 3) {
  // C
} else {
  // D
}
```





1-3 Comparisons



Always.
2 comparisons.