

# Iteration (1A)

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# Sigma Notation and Flow Chart

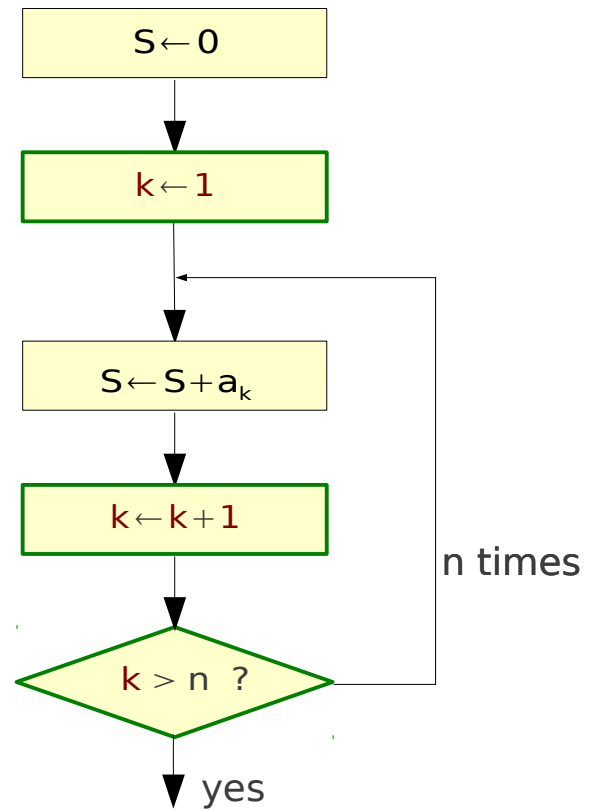
$$S_n = \sum_{k=1}^n a_k$$
$$= a_1 + a_2 + a_3 + \dots + a_n$$

$a_1=2,$   
 $a_2=4,$   
 $a_3=6,$   
 $a_4=8,$   
 $a_5=10$

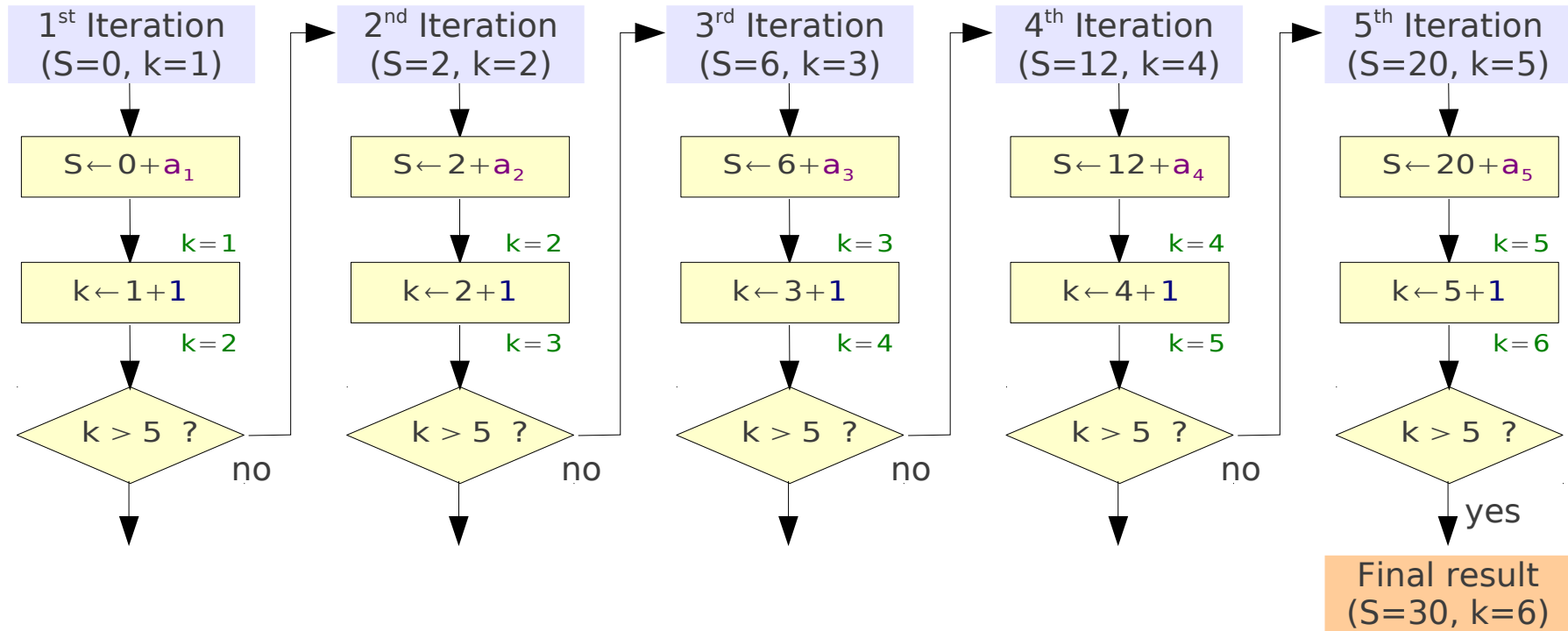
loop index  
initialization

loop index  
update

loop index  
condition check

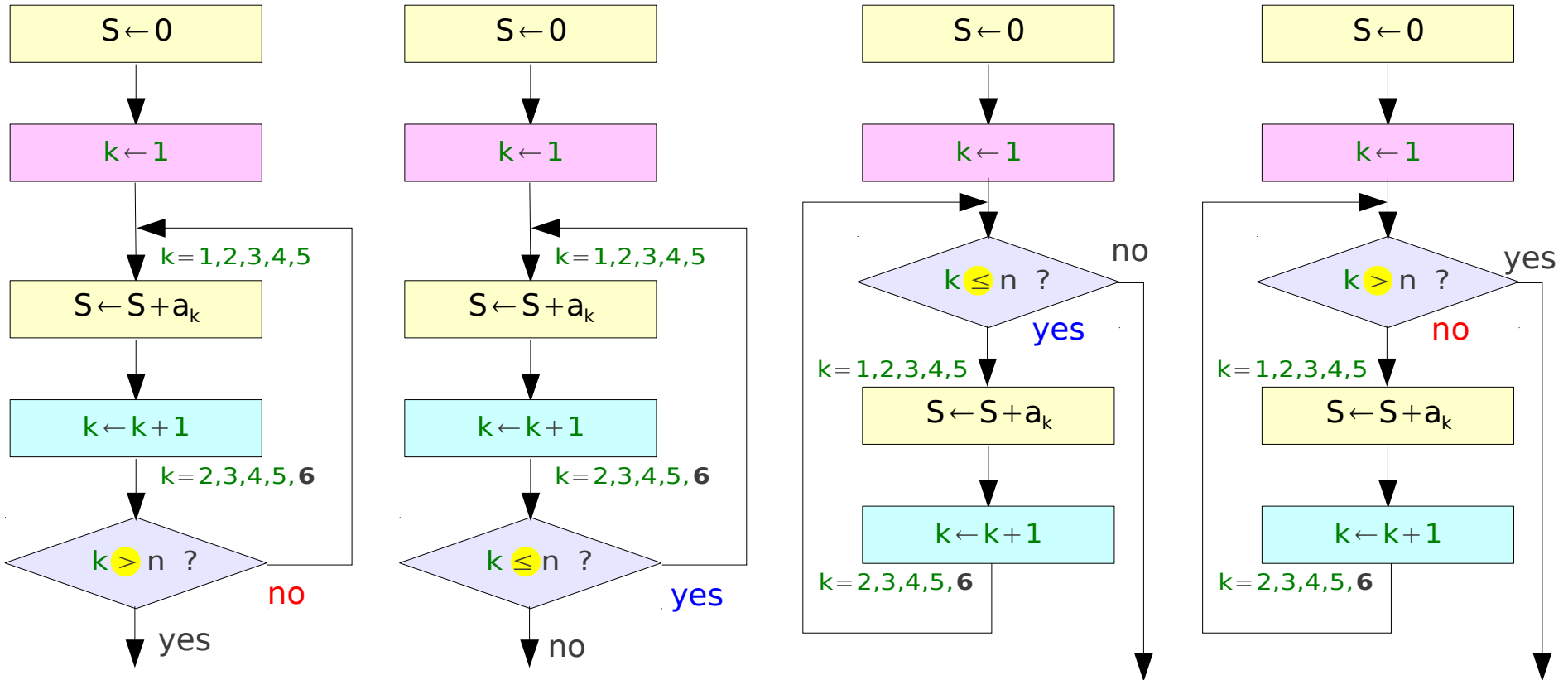


# Loop Unrolling

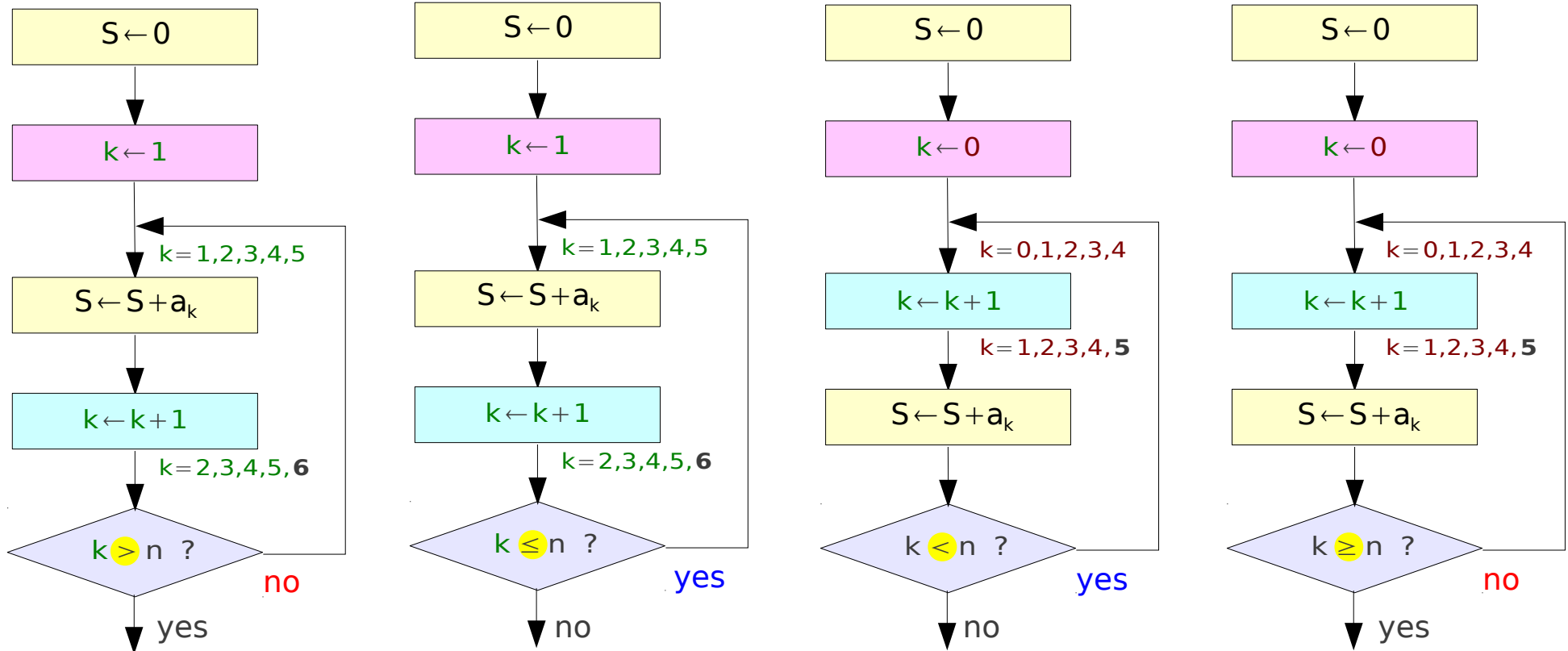


$a_1=2,$   
 $a_2=4,$   
 $a_3=6,$   
 $a_4=8,$   
 $a_5=10$

# Check Condition

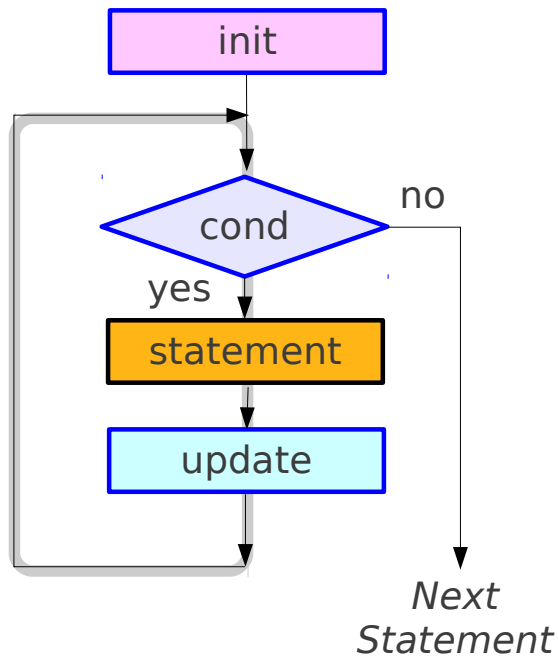


# Initial Condition

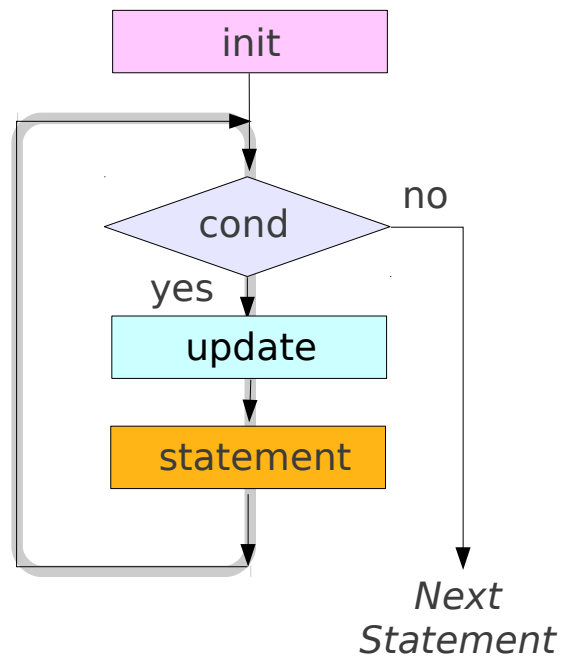


# Loop Statements

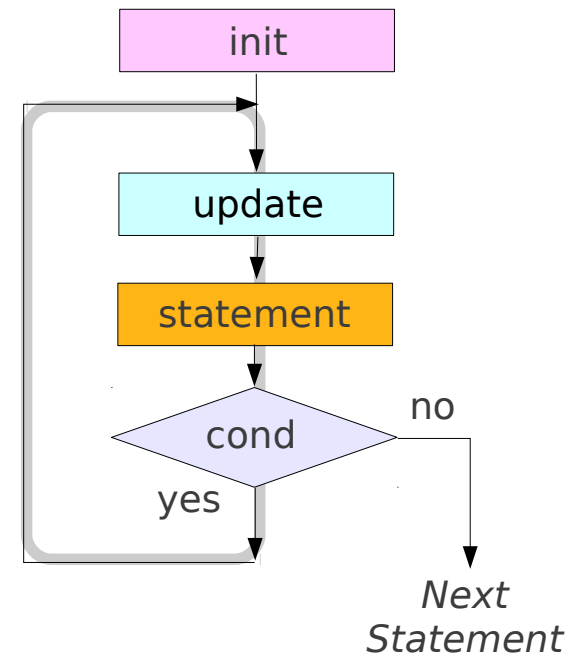
```
for (init ; cond; update) {  
    statements  
}
```



```
init  
while (cond) {  
    update  
    statements  
}
```

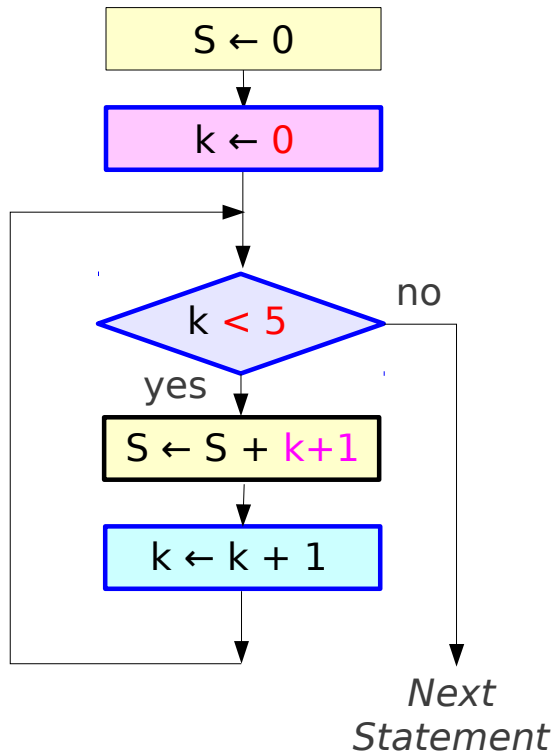


```
init  
do {  
    update  
    statements  
} while (cond);
```

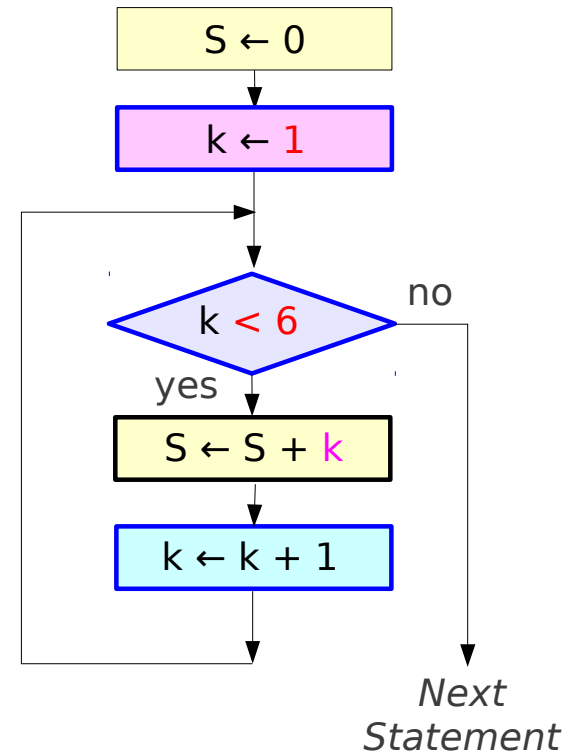


# for loop

```
S = 0;  
for (k=0; k<5; k++) {  
    S = S + k+1;  
}
```



```
S = 0;  
for (k=1; k<6; k++) {  
    S = S + k;  
}
```

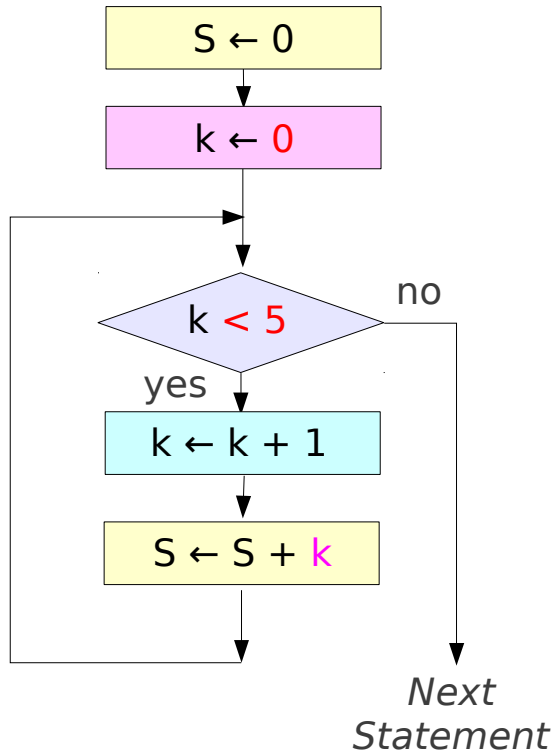


fixed

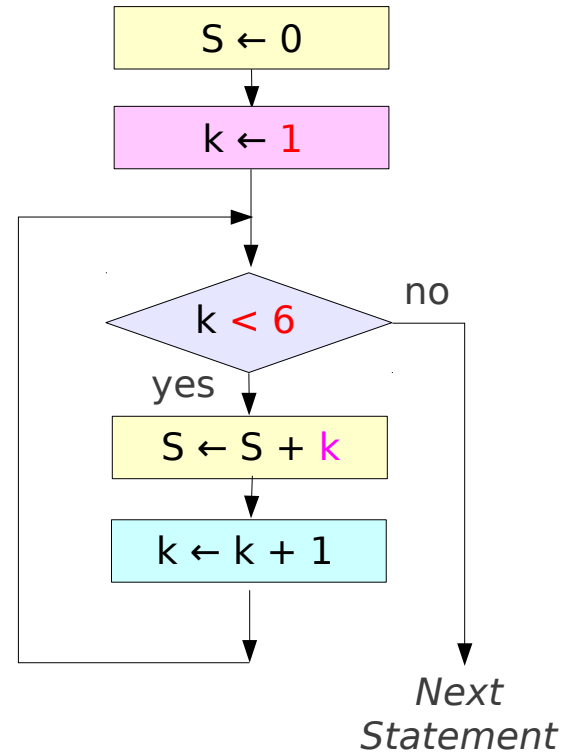


# while loop

```
S = 0; k=0;
while (k<5) {
    k = k+1;
    S = S+k;
}
```



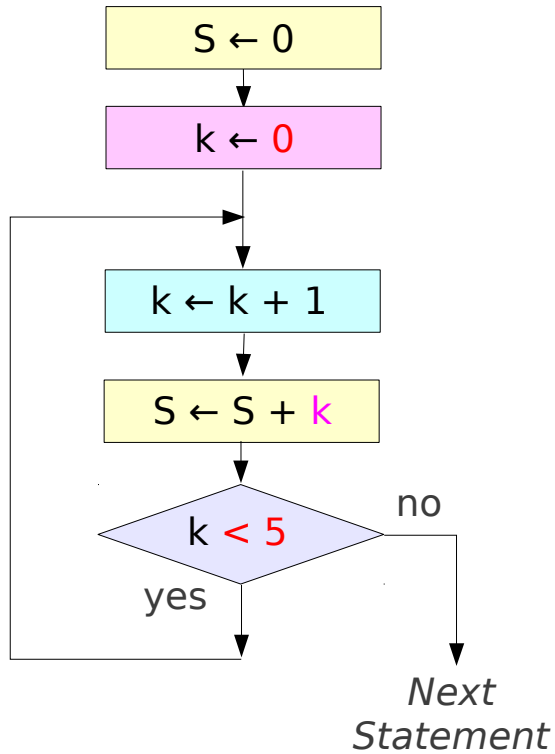
```
S = 0; k=1;
while (k<6) {
    S = S+k;
    k = k+1;
}
```



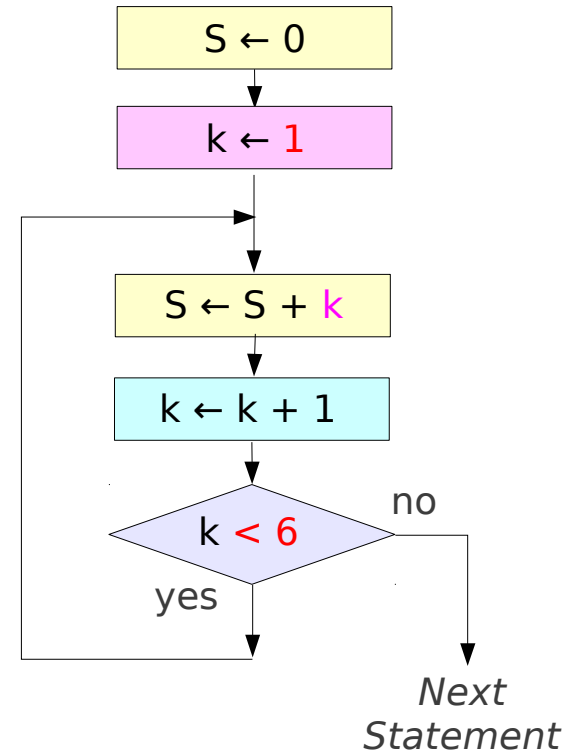
flexible

# do-while loop

```
S = 0; k=0;  
do {  
    k = k+1;  
    S = S+k;  
} while (k<5);
```



```
S = 0; k=1;  
do {  
    S = S+k;  
    k = k+1;  
} while (k<6);
```



*flexible,  
at least once*

# 2-d Array

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## References

- [1] Essential C, Nick Parlante
- [2] Efficient C Programming, Mark A. Weiss
- [3] C A Reference Manual, Samuel P. Harbison & Guy L. Steele Jr.
- [4] C Language Express, I. K. Chun