# INSERTION SORTING — DRYRUN

```
#include<stdio.h>
int main()
{
int a[5]={4,2,1,5,3}, i,j, temp;
for(i=1; i<5; i++)
  {
    temp=a[i];
    for(j=i-1; j>=0 && temp<a[j]; j--)
      {
        a[j+1]=a[j];
      }
    a[j+1]=temp;
  }
printf("After sorting \n");
for(i=0; i<5; i++)
  {
    printf("%d \n", a[i]);
  }
return 0;
}
```

main()

```
{
int a[5]={4,2,1,5,3}, i,j,temp;
for(i=1; i<5; i++)
  {
    temp=a[i];
    for(j=i-1; j>=0 && temp<a[j]; j--)
      {
        a[j+1]=a[j];
      }
    a[j+1]=temp;
  }
printf("After sorting \n");
for(i=0; i<5; i++)
  {
    printf("%d \n", a[i]);
  }
return 0;
}
```

| 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| 4 | 2 | 1 | 5 | 3 |

, i [ ] , j [ ] , temp [ ]

| i | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|

, j | 0 | -1 | 1 | 0 | -1 | 2 | 3 | 2 | 1 |

temp | 2 | 1 | 5 | 3 |

updating Array

| 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| 4 | 1 | 5 | 3 | |

i<5

for(j=i-1; j>=0 && temp<a[j]; j--);

1<5(T) → j = 1-1=0; (0>=0(T) && 2<a[0]=2<4(T))

a[j+1]=a[j];

a[0+1]=a[0] // 2=4 →

Do not place this 2 directly, we have to check that is j--

cond^ns

| 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| 2 | 4 | 1 | 5 | 3 |

F → j = 0-1=-1; (-1>=0(F) && 2<a[-1](F)) ..... ×

F → a[-1+1]=temp; // a[0]=2; ⇒ 2

2<5(T) → j=2-1=1; (1>=0(T) && 1<a[1]=1<4(T))

a[1+1]=a[1] // 1=4 →

| 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| | | 4 | 5 | 3 |

j=1-1=0; (0>=0(T) && 1<a[0]=1<2(T))

a[0+1]=a[0] // 4=2 →

| 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| | 2 | 4 | 5 | 3 |

j=0-1=-1; (-1>=0(F) && 1<a[0](F)) ..... ×

F → a[-1+1]=temp; // a[0]=1; ⇒ 1

| 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| 1 | 2 | 4 | 5 | 3 |

3<5(T) → j=3-1=2; (2>=0(T) && 5<a[2] // 5<4(F))

F → a[2+1]=5; // a[3]=5;

(If the cond^n is false then don't compare with the remaing element directly we can place that same variable to same location means verride)

| 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| 1 | 2 | 4 | 5 | 3 |

Sorted unsorted

4<5(T) → j=4-1=3; (3>=0(T) && 3<a[3] // 3<5(T))

a[3+1]=a[3] // 3=5

j=3-1=2; (2>=0(T) && 3<a[2] // 3<4(T)) ..... a[2+1]=a[3] // 5=4

j=2-1=1; (1>=0(T) && 3<a[1] // 3<2(F))

Sorted unsorted

| 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| 1 | 2 | 4 | 5 | 3 |

Do not place 3 directly here a[3], we have to check j--

| 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| | | | 4 | 5 |

5<5(F) ..... | 1 | 2 | 3 | 4 | 5 | (Sorted array)

| 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

After Sorting

| i | i<5 | a[i] |
|---|---|---|
| 0 | 0<5(T) → | a[0] → 1 |
| 1 | 1<5(T) → | a[1] → 2 |
| 2 | 2<5(T) → | a[2] → 3 |
| 3 | 3<5(T) → | a[3] → 4 |
| 4 | 4<5(T) → | a[4] → 5 |
| 5 | 5<5(F) → | × |

i++

Output Screen

After Sorting

1 2 3 4 5


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