Chapter 10-2 – Run-Time Analysis 3

Summations used in this semester

1. $\sum_{i=1}^{n} i = 1 + 2 + 3 + \cdots + n = \frac{n(n+1)}{2}$
2. $\sum_{i=1}^{n} 1 = 1 + 1 + 1 + \cdots + 1 = n$
3. $\sum_{i=1}^{n} i^2 = 1^2 + 2^2 + 3^2 + \cdots + n^2 = \frac{n(n+1)\,(2n+1)}{6}$
4. $\sum_{i=0}^{n} a^i = a^0 + a^1 + a^2 + \cdots + a^n = \frac{a^{n+1}-1}{a-1}$ if a >1

$$\frac{1}{a-1} \quad if\ 0 < a < 1$$

Example 1) What is the return value? total running time? Count number of operations.

```
int i, sum=0;
for (i = 0; i <= 3; i++)
      sum = sum + i;
```

```
int i, sum=0;

for (i = 0; i <= n; i++)

      sum = sum + i;
```

```
int i, sum=0;

for (i = 1; i < n; i++)

        sum = sum + i;
```

```
int i,j, sum=0;

for (i = 1; i < 3; i++)
   for (j =1; j < 3; j++)
       sum = sum + i + j;
```

```
int i,j, sum=0;

for (i = 1; i <= 3; i++)
   for (j =1; j <= 3; j++)
       sum = sum + i + j;
```

```
int i,j, sum=0;

for (i = 1; i < n; i++)
    for (j =1; j < n; j++)
        sum = sum + i + j;
```

```
int i,j, sum=0;

for (i = 1; i <= n; i++)
    for (j =1; j <= n; j++)
        sum = sum + i + j;
```

```
int i,j, sum=0;

for (i = 1; i < 3; i++)
    for (j =1; j <= i; j++)
        sum = sum + i + j;
```

```
int i,j, sum=0;

for (i = 1; i <= 3; i++)
    for (j =1; j <= i; j++)
        sum = sum + i + j;
```

```
int i,j, sum=0;

for (i = 1; i < 5; i++)
    for (j =1; j <= i; j++)
        sum = sum + i + j;
```


```
int i,j, sum=0;

for (i = 1; i <= 5; i++)
    for (j =1; j <= i; j++)
        sum = sum + i + j;
```

```
int i,j, sum=0;

for (i = 1; i < n; i++)
    for (j =1; j <= i; j++)
        sum = sum + i + j;
```

```
int i,j, sum=0;

for (i = 1; i <= n; i++)
    for (j =1; j <= i; j++)
        sum = sum + i + j;
```