

CSE 2331 Homework 2
Spring, 2016

Give the asymptotic running time of each the following functions in Θ notation. Justify your answer. (Show your work.)

1.

```
Func1(n)
1 s ← 0;
2 for i ← 23 to  $\lfloor n^{3/2} \rfloor$  do
3   for j ← 15 to  $i^2 \lfloor (\log_5(i))^2 \rfloor$  do
4     s ← s + i - j;
5   end
6 end
7 return (s);
```

2.

```
Func2(n)
1 s ← 0;
2 for i ←  $\lfloor n/2 \rfloor$  to  $\lfloor n \log_4(n) \rfloor$  do
3   for j ← i to  $\lfloor n \log_4(n) \rfloor$  do
4     for k ← 3j to 3j + 216 do
5       s ← s + i - j + k;
6     end
7   end
8 end
9 return (s);
```

3.

```
Func3(n)
1 s ← 0;
2 for i ←  $7n^2$  to  $n^3$  do
3   j ←  $\lfloor \sqrt{i} \rfloor$ ;
4   while (j ≥ 4) do
5     s ← s + i - j;
6     j ← j - 17;
7   end
8 end
9 return (s);
```

/* Note: Subtraction */

4.

```
Func4(n)
1 s ← 0;
2 for i ←  $\lfloor n/2 \rfloor$  to  $\lfloor n^{3/2} \rfloor$  do
3   for j ←  $\lfloor n/10 \rfloor$  to i do
4     for k ← j to i do
5       s ← s + i - j + k;
6     end
7   end
8 end
9 return (s);
```

5.

```

Func5(n)
1 s ← 0;
2 i ← 29;
3 while (i < n2) do
4   | j ← 6;
5   | while j ≤ 5n3 do
6   |   | s ← s + i - j;
7   |   | j ← 3 * j;
8   |   end
9   | i ← i + ⌈5√n⌉ ;
10 end
11 return (s);

```

/ Note: Addition */*

6.

```

Func6(n)
1 s ← 0;
2 i ← n;
3 while (i < ⌊n3√n⌋) do
4   | j ← 4;
5   | while (j < 3i) do
6   |   | s ← s + i - j;
7   |   | j ← j + 17 ;
8   |   end
9   | i ← 5 * i ;
10 end
11 return (s);

```

/ Note: Addition */*

/ Note: Multiplication */*

7.

```

Func7(n)
1 s ← 0;
2 for i ← 3 to ⌊n log3(n)⌋ do
3   | j ← i2;
4   | while (j > ⌈√i⌉) do
5   |   | s ← s + i - j;
6   |   | j ← ⌊j/7⌋ ;
7   |   end
8 end
9 return (s);

```

/ Note: Division */*

8.

```

Func8(n)
1 s ← 0;
2 i ← ⌊n log9(n)⌋;
3 while (i > 23) do
4   | /* Note: Division by i */
5   | for j ← 62 to ⌊n2 log7(n)/i⌋ do
6   |   | s ← s + i - j;
7   |   end
8   | i ← ⌊i/3⌋ ;
9 return (s);

```

/ Note: Division */*

9.

```
Func9(n)
1 s ← 0;
2 i ← ⌊√n⌋;
3 while (i > 3) do
4   j ← 5;
5   while (j < n4) do
6     s ← s + i - j;
7     j ← (1.1) * j;
8   end
9   i ← ⌊i/12⌋;
10 end
11 return (s);
```

/ Note: Multiplication */*

/ Note: Division */*

10.

```
Func10(n)
1 s ← 0;
2 i ← 25;
3 while (i < n3) do
4   j ← 6;
5   while (j < i2) do
6     s ← s + i - j;
7     j ← j + ⌊√i⌋;
8   end
9   i ← 7 * i;
10 end
11 return (s);
```

/ Note: Addition */*

/ Note: Multiplication */*