

Assignment 2

Time complexity analysis

Select a theta notation from among $\Theta(1)$, $\Theta(\log n)$, $\Theta(n)$, $\Theta(n \log n)$, $\Theta(n^2)$, $\Theta(n^3)$, $\Theta(2^n)$, or $\Theta(n!)$ for the number of times the statement $x = x+1$ is executed.

1Q) for i=1 to n

 for j=1 to i

 for k=1 to j

$x = x+1$

2Q) i=n

 while($i \geq 1$){

 for i =1 to j

$x = x+1$

$j = i/2$

 }

3Q) j=n

 while ($j \geq n$) {

 for i =1 to j

$x = x+1$

$j = j/3$

```
}
```

4Q) $i=n$

```
while( $i \geq 1$ ) {
```

```
  for  $j=1$  to  $n$ 
```

```
     $x=x+1$ 
```

```
   $i=i/2$ 
```

```
}
```

5Q) for $i := 1$ to n do

```
  for  $j:= 1$  to  $i$  do
```

```
    for  $k:= 1$  to  $j$  do
```

```
       $x := x+1;$ 
```

6Q) $i := 1;$

```
while ( $i \leq n$ ) do
```

```
{
```

```
   $x := x+1;$ 
```

```
   $i := i+1;$ 
```

```
}
```

7Q)

Algorithm Transpose(a, n)

```
{  
    for i:= 1 to n-1 do  
        for j:= i+1 to n do  
            {  
                t := a[i, j]; a[i, j] := a[j, i]; a[j, i] := t;  
            }  
        }  
}
```

8Q)

Algorithm Multi(a, b, c, n)

```
{  
    for i := 1 to n do  
        for j := 1 to n do  
            {  
                c[i, j] := c[i, j] + a[i, j] * b[k, j];  
            }  
        }  
}
```

```
}
```

9Q)

Algorithm D(x, n)

```
{  
    i := 1;  
    repeat  
    {  
        x[i] := x[i] + 2; i := i+2;  
    } until (i > n);  
    i := 1;  
    while (i ≤ ⌊n/2⌋) do  
    {  
        x[i] := x[i] + x[i+1]; i := i+1;  
    }  
}
```