

Sheet 1

A. Calculate the running time $t(n)$ using summation equation:

- 1) For (int $i = 1$; $i \leq n$; $i++$)
Print (i);
- 2) For (int $i = n-1$; $i \geq 1$; $i--$)
Print (i);
- 3) For (int $i = 1$; $i \leq n$; $i*=2$)
Print (i);
- 4) For (int $i = n$; $i \geq 1$; $i/=2$)
Print (i);
- 5) For (int $i = 1$; $i \leq n$; $i++$)
For(int $j = 1$; $j \leq n$; $j++$)
Print ("hello");
- 6) For (int $i = 1$; $i \leq n$; $i++$)
For(int $j = 1$; $j \leq i$; $j++$)
Print ("hello");
- 7) For (int $i = 1$; $i \leq n$; $i*=3$)
For(int $j = 1$; $j \leq n$; $j++$)
Print ("hello");
- 8) For (int $i = 1$; $i \leq n$; $i*=3$)
For(int $j = 1$; $j \leq n$; $j*=3$)
Print ("hello");
- 9) Int F(A, n)
S = 0
For $i = 0$ to $n-2$
For $j = i+1$ to $n-1$
If ($A_i > A_j$) S++
Return S

- 10) sum=0;
 for(i=0;i<n;i++)
 for(j=0; **j<n*n**;j++)
 sum++;
- 11) sum=0;
 for(j=0; j<n; j++)
 for(i=1; **i<j** ; i++)
 sum++;

 for(k=0; k<n; K++)
 A[k]=k;
- 12) Int Algo1(int n){
 Int sum = 0 ;
 For (int i = n; i>0; i++){
 For (int j=i+1;j<=n; j++){
 Sum = sum + 1;
 }
 }
 }
- 13) Int Algo2(int n){
 Int total=0;
 For(long int i=2; i<=n; i=i*i){
 total = total +1;
 cout<<i<<" "<<total<<endl;
 }
 }

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14)  Int Alog3(int n, int m){
      Int total=0;
      Int sum=0;
      For(int i=1; i<=n; i+=2){
      Total=total+1;
      cout<<i<<" "<<total<<endl;
      }
      For(int j=1; j<=m; j++){
          sum=sum+1;
          cout<<i<<" "<<sum<<endl;
      }
      For(int i=1; i<=n; i++){
          For(int j=1; j<=m; j++){
              sum=sum+1;
              cout<<i<<j<<" "<<sum<<endl;
          }
      }
  }

```

B. Suppose a machine on the average takes 10^{-8} seconds to execute a single algorithm step. What is **the largest input size** for which the machine will execute the algorithm in **2** seconds, assuming the number of steps of the algorithm is $T(n)$ =

1. $\log n$
2. \sqrt{n}
3. n
4. $n \log n$
5. n^2
6. n^3
7. 2^n

C. Assignments

```
1. For (i=1, i ≤ n, i++)  
    For (j=1, j ≤ i, j++)  
        print "hi"  
    end  
end
```

```
2. For (i=1, i ≤ n, i*=3)  
    For (j=1, j ≤ n, j++)  
        print "hi"  
    end  
end
```

```
3. For (i=1, i ≤ n, i*=3)  
    For (j=1, j ≤ n, j*=3)  
        print "hi"  
    end  
end
```