1. Find the sum of a geometric series for which the first term is 1, each term is multiplied by 2 to get the next term, and the number of terms in the sequence is 32



Verify that this answer is the same as the complexity of the Towers of Hanoi with n = 32 disks



= 232 – 1 / 2-1

= 232 – 1

**= 4,294,967,295**

1. As we have seen, if there are n vertices in the graph, then for the TSP (Travelling Salesman Problem), once a starting point is chosen, there are (n−1)! circuits to examine, because there are n−1 choices for the second vertex, n−2 choices for the third vertex, and so on. We need only examine (n−1)!/2 circuits because half of them are the same in reverse.

So with n= 25 vertices, a total of 24!/2 (approximately 3.1×1023) different circuits would have to be considered. If it took just one nanosecond (10−9 second) to examine each circuit, then how many years would be required to ﬁnd a minimum-length circuit in this graph by exhaustive search techniques.

= 3.1 \* 1023 \* 10-9 - Circuits to nanoseconds

= 3.1e + 14 / 60 - Nanoseconds to seconds

= 5.1666667e + 12/ 60 - Seconds to minutes

= 861111111117e + 17 / 60 - Minutes to hours

= 3587962962.9629629629629629629629875 / 24 - Hours to days

**= 9830035.514967 - Days to years**

1. Use Mathematical summations to calculate the complexities of the following? The problem size is ***n***, ***S*** are constant time operations, and ***a*** is a constant greater than 1
2. **for**j ← 1 **to** n

**if** A[j] < A[min] **then**

S

**= ∑nj=1 S**

**= S∑nj=1**

**= (n – 1 + 1) \* 1**

**= n = O(n)**

1. **for**i ← 1 **to** n Do

**for** j ← 1 **to** i Do

S

**= ∑ni=1 ∑nj=1**

**= ∑ni=1 (n)**

**= n \* n**

**= N2 = O(n2)**

1. **for**i ← 1 **to** n Do

**for** j ← 1 **to** n Do

S1

**for** k ← 1 **to** j do

S2

**T(n) = ∑ni=1∑nj=1∑jk=1**

**= ∑ni=1∑nj=1J**

**= (n2/2 + n/2) ∑ni=1**

**= (n2/2 + n/2)n**

**= n3/2 + n/2**

1. i ← 1

**while** (i ≤ n)

i ← i\*2

S

**= 2k = n**

**= Log2k = log2n**

**= k(1) = log2n**

**= k = log2n**