

Assignment I

1. Write a recursive method in pseudo code that returns the number of 1's in the binary representation of N . Use the fact that this equal to the number of 1's in the representation of $N/2$, plus 1, if N is odd. [5 Points]

2. Evaluate the following sums: [10 Points]

a. $\sum_{i=0}^{\infty} \frac{1}{4^i}$

b. $\sum_{i=0}^{\infty} \frac{i}{4^i}$

3. Let F_i be the Fibonacci numbers. Prove the following: [5 Points]

$$\sum_{i=1}^{N-2} F_i = F_N - 2$$

4. Prove by induction [5 Points]

$$1^3 + 2^3 + 3^3 + \dots + n^3 = \frac{n^2(n+1)^2}{4}$$