

05.01.2017

DISCRETE MATHEMATICS FINAL EXAM

1) The Harmonic numbers $H_i, i = 1, 2, 3 \dots$ is defined as follows :

$$H_i = 1 + \frac{1}{2} + \frac{1}{3} + \dots + \frac{1}{i}$$

Use mathematical induction to show that

$$H_{2^n} \geq 1 + \frac{n}{2}$$

whenever n is a nonnegative integer.

2) Find an explicit formula for Fibonacci numbers whose recursive relation is :

$$f_n = f_{n-1} + f_{n-2} \quad f_0 = 1 \text{ and } f_1 = 1$$

3) A simple graph is called regular if every vertex of this graph has the same degree. A regular graph is called n -regular if every vertex in this graph has degree n .

a) How many vertices does a regular graph of degree four with 10 edges have?

b) Investigate if K_n, C_n and W_n is a regular graph or not.