

Math 450 Combinatorics The Real Homework #10 Due Wednesday, November 14

Do 5 of the following problems.

1. Suppose that the first terms of the sequence h_n is given for $0 \leq n \leq 20$ as follows:

5, 4, 7, 14, 25, 40, 59, 82, 109, 140, 175, 214, 257, 304, 355, 410, 469, 532, 599, 670, 745.

Is h_n defined by a polynomial function? If so, determine the function defining h_n .

2. Prove Euler's second identity:

$$\prod_{i=1}^{\infty} (1 + x^{2i}) = 1 + \sum_{k \geq 1} \frac{x^{k(k+1)}}{(1-x^2)(1-x^4) \cdots (1-x^{2k})}.$$

3. 2.4.5

4. 2.4.8

5. 2.4.15

6. Seven points are chosen from the interior of a circle with radius 1. Show that there exists a pair of points that are at a distance less than 1 from each other.