Combinatorics HW w6-1

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1. **Please prove the following equation of fibonacci sequence Fi:**



Let us remember the fact that

Let us apply this formula to allwhereis an odd number:

Adding these together, almost all terms on the right are canceled. We get:

1. **Please provide the corresponding characteristic equations for the following recurrence relation:**

Let us rearrange the equation:

The corresponding characteristic equation is

1. **Solve the recurrence relation *hn*=2*hn*-1+8*hn*-2 ,n≥2, *h*1=1, *h2*=10**

Let us first rearrange the relation:

This is a linear, homogeneous recurrence relation. As a consequence, we can directly derive its characteristic equation:

Proceeding from here, we can find the roots by rewriting the left-hand side as a product:

Thus, the roots of this equation areand. Building on this, let us formulate our candidate for’s closed-form solution:

We can find the value of the two constants using the initial conditions.

Solving this simple, fully defined system of linear equations, we get

… i.e. the closed-form solution for the given recurrence relation is