Problem Set 6

[Your Full Name Here]

MATH 100 — Introduction to Proof and Problem Solving — Summer 2023

Problem 6.1. Prove that $7 \mid (3^{4n+1} - 5^{2n-1})$ for every positive integer n.

Solution. □

Problem 6.2. A sequence $\{a_n\}$ is defined recursively by $a_1 = 1$, $a_2 = 4$, $a_3 = 9$ and

$$a_n = a_{n-1} - a_{n-2} + a_{n-3} + 2(2n-3), \quad \text{for } n \geqslant 4$$

(a) Use the recursive relation to compute a_4, a_5, a_6, a_7.

   Solution.   □

(b) Looking at the values for a_1, a_2, a_3, a_4, a_5, a_6 and a_7, conjecture a formula for a_n, that is, an expression in terms of n.

   Solution.   □

(c) Prove your conjecture using an appropriate principle of mathematical induction, using the recursive relation.

   Solution.   □

Collaborators:

References:

- [Book(s): Title, Author]

- [Online: Link]

- [Notes: Link]

Fin.