Лабораторная работа №1 | B-5 | Колодин Матвей

Задание 1.1.5

Для начала получим сумму ряда аналитическим способом:

$$S_N = \sum_{n=0}^{N} \frac{48}{5(n^2+6n+5)} = \frac{48}{5}\sum_{n=0}^{N} \frac{1}{(n+1)(n+5)} = \left\{\frac{1}{(n+1)(n+5)} = \frac{A}{n+1} + \frac{B}{n+5} = \frac{1}{4}\frac{1}{n+1} - \frac{1}{4}\cdot\frac{1}{n+5}\right\} = \frac{12}{5}\sum_{n=0}^{N}\left(\frac{1}{n+1} - \frac{1}{n+5}\right) =$$

$$= \left\{\sum_{n=0}^{N} \frac{1}{n+1} - \frac{1}{n+5} = 1+\frac{1}{2}+\frac{1}{3}+\frac{1}{4}+\frac{1}{5}+\frac{1}{6} - \frac{1}{5} - \frac{1}{6} - \frac{1}{7} \dots = 1 + \frac{6+4+3}{12} = 2\frac{1}{12} = \frac{25}{12}\right\} = \frac{12}{5}\cdot\frac{25}{12} = \boxed{5}$$

Ответ: $\sum_{n=0}^{\infty} \frac{48}{5(n^2+6n+5)} = 5$