Домашня робота 12

1. $\displaystyle\sum_{n=1}^{\infty}\left(\frac{3}{4}\right)^n =$

$$b_1 = \frac{3}{4}, \; q = \frac{3}{4}$$

$$= \frac{b_1}{1-q} = \frac{\frac{3}{4}}{1-\frac{3}{4}} = 3$$

2. $\displaystyle\sum_{n=1}^{\infty}\frac{1}{(5n-4)(5n+1)} = \sum_{n=1}^{\infty}\left(-\frac{1}{25\left(n+\frac{1}{5}\right)}+\frac{1}{25\left(n-\frac{4}{5}\right)}\right) = \left(\frac{1}{5}-\frac{1}{30}\right)+\left(\frac{1}{30}-\frac{1}{55}\right)+$

$+ \left(\dfrac{1}{55}-\dfrac{1}{88}\right)+\cdots = \dfrac{1}{5}$

3. $\displaystyle\sum_{n=1}^{3}\left(\frac{n}{n+1}\right)^{n-1} = 1 + \frac{2}{3} + \frac{9}{16} = \frac{107}{48}$

4. $\displaystyle\sum_{n=9}^{\infty}\frac{18}{n^2-13n+40} = \sum_{n=9}^{\infty}\left(-\frac{6}{n-5}+\frac{6}{n-8}\right) = \left(6-\frac{3}{2}\right)+\left(3-\frac{6}{5}\right)+(2-1)+$

$+\left(\dfrac{3}{2}-\dfrac{6}{7}\right)+\left(\dfrac{6}{5}-\dfrac{3}{4}\right)+\left(1-\dfrac{2}{3}\right)+\cdots = 11$