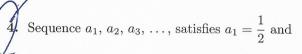
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- 1. Find in terms of n short form of the sum $1 \cdot 1! + 2 \cdot 2! + 3 \cdot 3! + \ldots + n \cdot n!$
- 2. Find in terms of n short form of the sum $\sum_{i=1}^{n} \frac{1}{(3i-1)(3i+2)}$.
- 3. Find in terms of n short form of the sum $\sum_{i=1}^{n} \frac{1}{i(i+1)(i+2)}$.



$$a_1 + a_2 + \ldots + a_n = n^2 a_n$$
 for $n = 1, 2, 3, \ldots$

Compute a_n for all $n = 1, 2, 3, \ldots$

5. Sequence a_0, a_1, a_2, \ldots satisfies $a_0 = 1, a_1 = 2$ and

$$n(n+1)a_{n+1} = n(n-1)a_n - (n-2)a_{n-1}$$
 for all $n \ge 1$.

Compute sum $\frac{a_0}{a_1} + \frac{a_1}{a_2} + \ldots + \frac{a_{50}}{a_{51}}$.

- **6.** Sequence a_n of positive numbers satisfies for each natural n inequality $a_n^2 \le a_n a_{n+1}$. Prove that for each natural n holds $a_n \le \frac{1}{n}$.
- 7. Sequence a_0, a_1, \ldots, a_n satisfies

$$a_0 = \frac{1}{2}$$
 and $a_k = a_{k-1} + \frac{a_{k-1}^2}{n}$ for $k = 1, 2, \dots, n$.

Prove that

- a) $a_n < 1;$
- b) $1 \frac{1}{n} < a_n$.

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