Use mathematical induction to prove $\sum_{i=1}^{n} \frac{i}{3^i} = \frac{3}{4} - \frac{2n+3}{4 \cdot 3^n}$ for all natural numbers n.

Proof: We prove $P(n)$ is true for all natural numbers n by induction.

Base Case: When $i = 1$,

$$\sum_{i=1}^{1} \frac{i}{3^i} = \frac{3}{4} - \frac{2(1)+3}{4 \cdot 3^1} = \frac{3}{4} - \frac{5}{12} = \frac{9}{12} - \frac{5}{12} = \frac{4}{12} = \frac{1}{3}$$

Induction Hypothesis: Assume $P(k)$ is true for all natural numbers $1 \leq i \leq k$, $k \geq 2$. That is, assume that

$$P(k) = \sum_{i=1}^{k} \frac{k}{3^k} = \frac{3}{4} - \frac{2k+3}{4 \cdot 3^k}$$

Induction Conclusion: For $P(k+1)$,

$$\begin{aligned}
\sum_{i=1}^{k+1} \frac{i}{3^i} &= \sum_{i=1}^{k} \frac{i}{3^i} + \frac{k+1}{3^{k+1}} \\
&= \frac{3}{4} - \frac{2k+3}{4 \cdot 3^k} + \frac{k+1}{3^{k+1}} \\
&= \frac{3}{4} - \frac{6k+9}{4 \cdot 3^{k+1}} + \frac{4k+4}{3^{k+1}} \\
&= \frac{3}{4} - \frac{6k+9+4k+4}{4 \cdot 3^{k+1}} \\
&= \frac{3}{4} - \frac{10k+13}{4 \cdot 3^{k+1}} \\
&= \frac{3}{4} - \frac{2(k+1)+3}{4 \cdot 3^{k+1}}
\end{aligned}$$

Therefore $P(k+1)$ is true.