S 176

$$0 + 1 + 2 + \dots + (n-1) = \sum_{k=1}^{n} \underbrace{(k-1)}_{a_k} = \underbrace{\tfrac{1}{2}(n-1)\cdot n}_{S_n}$$

-1

$$(1 + 2 + 3 + \dots + n = \sum (k) = \tfrac{1}{2} n \cdot (n+1)$$

$n = 1 \qquad a_1 = S_1 \qquad (1-1) = 0 = \tfrac{1}{2}\cdot(1-1)\cdot 1$ ✓

$n+1 \qquad S_n + a_{n+1} = S_{n+1}$

$$\tfrac{1}{2}(n-1)\cdot \underline{n} + \underline{n} = \tfrac{1}{2}\cdot \underline{n} \cdot (n+1) \qquad | : n$$

$$\tfrac{1}{2}n - \tfrac{1}{2} + 1 = \tfrac{1}{2}n + \tfrac{1}{2} \qquad | - \tfrac{1}{2}n - \tfrac{1}{2}$$

$$0 = 0$$

S. 184 Nr. 1)

$$\sum_{k=3}^{8} \left(\tfrac{3}{4}\right)^k = \sum_{k=0}^{8} \left(\tfrac{3}{4}\right)^k - \sum_{k=0}^{2} \left(\tfrac{3}{4}\right)^k$$

Teilfolge

$$\frac{1-\left(\tfrac{3}{4}\right)^9}{1-\tfrac{3}{4}} - \frac{1-\left(\tfrac{3}{4}\right)^3}{1-\tfrac{3}{4}}$$

$$4\cdot\left(1-\left(\tfrac{3}{4}\right)^9\right) - 4\cdot\left(1-\left(\tfrac{3}{4}\right)^3\right)$$

$$\Rightarrow 4\cdot\left[\left(\tfrac{3}{4}\right)^3 - \left(\tfrac{3}{4}\right)^9\right]$$

2) $$\sum_{k=2}^{5} \left(\tfrac{1}{3}\right)^{k+2} = \sum_{k=2}^{5} \left(\tfrac{1}{3}\right)^{k} \cdot \left(\tfrac{1}{3}\right)^{2} = \tfrac{1}{9} \cdot \sum_{k=2}^{5} \left(\tfrac{1}{3}\right)^{k}$$

$$\tfrac{1}{9} \cdot \left[\sum_{k=0}^{5} \left(\tfrac{1}{3}\right)^{k} - \left(\left(\tfrac{1}{3}\right)^{0} + \left(\tfrac{1}{3}\right)^{1} \right) \right]$$

$$\tfrac{1}{9} \cdot \left(\frac{1 - \left(\tfrac{1}{3}\right)^{6}}{1 - \tfrac{1}{3}} - \frac{4}{3} \right) = \tfrac{1}{6} \cdot \left(1 - \left(\tfrac{1}{3}\right)^{6} \right) - \frac{4}{27}$$

$$\frac{1}{9} \cdot \frac{\left(1 - \left(\tfrac{1}{3}\right)^{6}\right)}{2/3} = \tfrac{1}{9} \cdot \tfrac{3}{2} \cdot \left(1 - \left(\tfrac{1}{3}\right)^{6} \right)$$

3) $\sum_{k=4}^{6} 4\cdot\left(\tfrac{1}{2}\right)^{k-2} = \sum_{k=4}^{6} 4\cdot\left(\tfrac{1}{2}\right)^{k}\cdot\left(\tfrac{1}{2}\right)^{-2}$

$\Rightarrow 16\cdot\sum_{k=4}^{6}\left(\tfrac{1}{2}\right)^{k} = 16\cdot\sum_{k=0}^{2}\left(\tfrac{1}{2}\right)^{k+4}$

$16\cdot\sum_{k=0}^{2}\left(\tfrac{1}{2}\right)^{k}\cdot\left(\tfrac{1}{2}\right)^{4} = \sum_{k=0}^{2}\left(\tfrac{1}{2}\right)^{k} = \dfrac{1-\left(\tfrac{1}{2}\right)^{3}}{1-\tfrac{1}{2}}$

$2\cdot\left(1-\left(\tfrac{1}{2}\right)^{3}\right) = 2\cdot\tfrac{7}{8} = \tfrac{7}{4}$

S 190 Nr. 1

$$\sum_{k=3}^{\infty} \frac{3^k}{k!} = \sum_{k=0}^{\infty} \frac{3^k}{k!} - \sum_{k=0}^{2} \frac{3^k}{k!}$$

$$e^3 - \left[\frac{3^0}{0!} + \frac{3^1}{1!} + \frac{3^2}{2!}\right]$$

$$e^3 - \left(1 + 3 + \frac{9}{2}\right) = e^3 - 8{,}5$$

Nr. 2

$$\sum_{k=2}^{5} \left(\frac{2}{3}\right)^k = \left(\frac{2}{3}\right)^2 + \left(\frac{2}{3}\right)^3 + \left(\frac{2}{3}\right)^4 + \left(\frac{2}{3}\right)^5$$

$$= \frac{1 - \left(\frac{2}{3}\right)^6}{1 - \frac{2}{3}} - \left(\left(\frac{2}{3}\right)^0 + \left(\frac{2}{3}\right)^1\right)$$

$$3 \cdot \left(1 - \frac{2}{3}\right)^6 - 1\frac{2}{3}$$

$$\underbrace{\sum_{k=1}^{\infty} \left(2/k\right)^2}_{\text{Grenzwert}} - \underbrace{\sum_{k=0}^{3} 5^k}_{\text{Partialsumme}} = 2/3\,\pi^2 - 156$$

$q > 1$

$$\sum_{k=1}^{\infty} \left(4/k^2\right) = 4 \cdot \sum_{k=1}^{\infty} 1/k^2 = 4 \cdot \frac{\pi^2}{6} = \frac{2}{3}\pi^2$$

$$\sum_{k=0}^{3} 5^k = 5^0 + 5^1 + 5^2 + 5^3 = 156$$