1) $\sum (-1)^{k+1} \cdot \frac{\sqrt{k+1}}{k} \cdot 42$

2) $\sum \frac{(k+1) \cdot 3^k}{(2k+1)!}$

3) $\sum \frac{\sin^k(k)}{(3+k)^k}$

4) $\sum \frac{k^2 \cdot 5^k}{(3k)!}$

5) $\sum (-3)^{2k+1} \cdot \frac{2}{3^{4k}}$

6) $\sum_{k=3}^{5} 1/4 \cdot (2)^{-2k}$

7) $\sum_{k=2}^{\infty} \frac{2^{2k+1}}{3k!}$

8) $\sum_{k=2}^{\infty} (-1)^{k+1} \cdot \frac{2 \cdot 4^k}{(2k+1)!}$

9) $\sum_{k=3}^{\infty} \left(\left(1/3\right)^{2k} - \left(2/k\right)^2 \right)$

$\xrightarrow{\text{Wert der Reihe}}$

1) <u>Leibniz</u>, da $(-1)^{k+1}$ alternierend ist.

$$42 \cdot \sum \underline{(-1)^{k+1}} \cdot \frac{\sqrt{k+1}}{k} \Rightarrow \lim_{k \to \infty} \frac{\sqrt{k+1}}{k} = \lim_{k \to \infty} \frac{\sqrt{k+1}}{\sqrt{k^2}}$$

<u>Konvergent</u> $\Leftarrow$ $$\lim_{k \to \infty} \sqrt{\frac{k+1}{k^2}} = \lim_{k \to \infty} \sqrt{\frac{\cancel{k} \cdot (1 + 1/k)}{k^{\cancel{2}}}} = 0$$

2) $$\sum \frac{(k+1) \cdot 3^k}{(2k+1)!} \Rightarrow \text{Quotientensatz, da "!"}$$

$$\lim_{k \to \infty} \frac{a_{k+1}}{a_k} = \lim_{k \to \infty} \frac{\underbrace{((k+1)+1) \cdot 3^{k+1}}_{} \cdot (2k+1)!}{\underbrace{(2(k+1)+1)!}_{a_{k+1}} \quad \underbrace{3^k \cdot (k+1)}_{1/a_k}}$$

$$\lim_{k \to \infty} \frac{\cancel{3^{k+1}} \; (k+2) \; (2k+1)!}{\cancel{3^k} \; (k+1) \; (2k+1)! \, (2k+3)(2k+2)} = \lim_{k \to \infty} \frac{3 \cdot (k+2)}{(k+1)(2k+3)(2k+2)}$$

$$\lim_{k \to \infty} \frac{3 \cdot \cancel{k}(1 + \overset{0}{2/k})}{\cancel{k} \cdot (1 + 1/k)(2k+3)(2k+2)} = \left[\frac{3}{1 \cdot (2k+3)(2k+2)}\right] = 0 < 1$$

3) $\sum \frac{\sin^k(k)}{(3+k)^k}$ => Wurzelsatz

$$\lim_{k\to\infty} \sqrt[k]{\frac{\sin^k(k)}{(3+k)^k}} = \lim_{k\to\infty} \frac{\sin(k)}{3+k} = \left[\frac{[-1;1]}{3+k}\right] = 0 < 1$$

5) $\sum (-3)^{2k+1} \cdot \frac{2}{3^{4k}} = \sum \underbrace{(-1)^{2k+1}} \cdot 3^{2k+1} \cdot \frac{2}{3^{4k}}$

$$\sum (-1) \quad 3^{2k} \cdot 3^1 \cdot {}^2/_{3^{4k}}$$

$$-6 \cdot \sum \frac{3^{2k}}{3^{4k}} = -6 \cdot \sum \left(\frac{3^2}{3^4}\right)^k = -6 \cdot \sum \left(\frac{1}{9}\right)^k$$

$\sum q^k$ ist konvergent, wenn $|q| < 1$ $\qquad q = 1/9 < 1$ ✓

$$\lim_{k\to\infty} \sqrt[k]{(1/9)^k} = 1/9 < 1$$ Konvergent