Serie

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1) $Z\,\frac{n^n}{3^{n^2}} = \sqrt[n]{\frac{n^n}{3^{n^2}}} = \frac{3^{\frac{n}{n}}}{3^{\frac{n^2}{n}}} = \frac{3}{3^n} = 0 \to converge$

2) $Z\,\frac{n^n}{(n!)^2} = \frac{\frac{(n+1)^{(n+1)}}{((n+1)!)^2}}{\frac{n^n}{(n!)^2}} = \frac{(n+1)^{(n+1)}}{((n+1)!)^2} * \frac{(n!)^2}{n^n}$

$= \frac{(n+1)^{(n+1)}}{(n+1)^2 * (n!)^2} * \frac{(n!)^2}{n^n} = \frac{(n+1)^n * (n+1)}{(n+1)^2} * \frac{1}{n^n}$

$= \frac{(n+1)^n}{n^n} * \frac{1}{(n+1)} = \left(\frac{n+1}{n}\right)^n * \frac{1}{n+1} = \left(1+\frac{1}{n}\right)^n * \frac{1}{n+1} = e * 0 = 0$

-> *Converge*

3) $Z\; n * \sin\left(\frac{1}{n}\right) = \frac{\sin\left(\frac{1}{n}\right)}{\frac{1}{n}} = 1 \to diverge$

$n.b. \to n = \frac{1}{\frac{1}{n}}$

4) $Z\,\frac{1}{n+3^n} \sim \frac{1}{3^n} = \left(\frac{1}{3}\right)^n \to converge$

5) $N\,\frac{\sin(2n)}{n+3^n} \sim \left|\frac{1}{n+3^n}\right| = \frac{1}{3^n} = \left(\frac{1}{3}\right)^n \to diverge$

Nb. Solo infinitesimi

6) $Z\,\frac{(-1)^n * n}{3n+1} = (-1)^n * \frac{n}{3n+1}$

$\lim_{x\to inf} \frac{n}{3n+1} \sim \frac{n}{3n} = \frac{1}{3} \to non\ è\ 0 \to diverge$

7) $Z\,\frac{n!}{e^{n^2}} = \frac{(n+1)!}{e^{(n+1)^2}} * \frac{e^{n^2}}{n!} = \frac{(n+1)*n!}{e^{n^2+2n+1}} * \frac{e^{n^2}}{n!} = \frac{n+1}{e^{2n}*e} = 0 \to converge$