Consider $\sum_{1}^{\infty} a_n$. Let $\lim_{n\to\infty} \sqrt[n]{|a_n|}$

If
$r < 1 \Rightarrow$ series is absolutely convergent
$r > 1 \Rightarrow$ series is divergent
$r = 1 \Rightarrow$ wrong test

E.g., 1) $\sum_{n=1}^{\infty} \left(-\frac{2}{3}\right)^n \quad \lim_{n\to\infty} \left|\sqrt[n]{\left|\left(-\frac{2}{3}\right)^n\right|}\right| = \frac{2}{3} < 1 \Rightarrow \sum_{1}^{\infty} \left(-\frac{2}{3}\right)^n$ is absolutely convergent.

2) $\sum_{1}^{\infty} \frac{n^n}{2^n} \quad \lim_{n\to\infty} \sqrt[n]{\left(\frac{n}{2}\right)^n} = \lim_{n\to\infty} \frac{n}{2} = \infty \Rightarrow \sum_{1}^{\infty} \frac{n^n}{2^n}$ is divergent.

Determine if the following series are absolutely convergent, conditionally convergent, or divergent:

1) $\sum_{1}^{\infty} \frac{(n^2+1)^n}{(3n^2+4)^n}$

2) $\sum_{1}^{\infty} \left(\frac{e}{11}\right)^n$

3) $\sum_{1}^{\infty} \frac{(2n)^{2n}}{(n^2+1)^n}$