I.9 Partial Product 2

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March 1, 2019

For the infinite series in the form of:

$$\prod_{n=1}^{\infty}(1+\frac{f(n)}{g(n)}).$$

It converges when $f(n) < g(n)$, such as,

$$\prod_{n=1}^{\infty}(1+\frac{n^2}{n^5}).$$

It diverges to infinity when $f(n) \geq g(n)$, such as,

$$\prod_{n=1}^{\infty}(1+\frac{n^5}{n^2}).$$

Then, it seemed that when the polynomials in the fraction were longer than n^a, where a is some positive number, that the sequence diverges to infinity.
For the infinite series in the form of:

$$\prod_{n=1}^{\infty}(1+b^n).$$

It converges when $b < 1$, such as,

$$\prod_{n=1}^{\infty}(1+(\frac{1}{4})^n).$$

It diverges to infinity when $b \geq 1$, such as,

$$\prod_{n=1}^{\infty}(1+4^n).$$