Contents

Expression for expansion of euler’s number raised to the power of x in algebra

$$e^x = 1 + \frac{x}{1!} + \frac{x^2}{2!} + \frac{x^3}{3!} + ... + \frac{x^r}{r!} + ...\infty$$

Proof for the expansion of euler’s number raised to the power x in algebra

- $$\text{If } n > 1 \text{ then } \frac{1}{n} < 1$$
- $$(1 + \frac{1}{n})^{nx} = 1 + nx.\frac{1}{n} + \frac{nx.(nx-1)}{2!}.\frac{1}{n^2} + \frac{nx.(nx-1)(nx-2)}{3!}\frac{1}{n^3} + ...$$
- $$(1 + \frac{1}{n})^{nx} = 1 + x + \frac{x(x-\frac{1}{n})}{2!} + \frac{x(x-\frac{1}{n})(x-\frac{2}{n})}{3!} + ...$$
- On infinitely large value of n
- $$(1 + \frac{1}{n})^{nx} = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + ...$$
- $$x = 1$$
- $$\lim_{n\to\infty}(1 + \frac{1}{n})^n = 1 + \frac{1}{1!} + \frac{1}{2!} + \frac{1}{3!} + \ldots = e$$
- $$(1 + \frac{1}{n})^{nx} = (1 + \frac{1}{n})^x = e^x \text{as} e^x \to \infty$$
- $$e^x = 1 + \frac{x}{1!} + \frac{x^2}{2!} + \frac{x^3}{3!} + ... + \frac{x^r}{r!} + ...\infty$$

Expression for the expansion of euler’s number raised to the power -x in algebra

$$e^{-x} = 1 - \frac{x}{1!} + \frac{x^2}{2!} - \frac{x^3}{3!} + ... + (-1)^r\frac{x^r}{r!} + ...$$

Expression for expansion of euler’s number in algebra

$$e = 1 + \frac{1}{1!} + \frac{1}{2!} + \frac{1}{3!} + ...$$

Expression for expansion of euler's number raised to the power -1 in algebra

$$e^{-1} = 1 - \frac{1}{1!} + \frac{1}{2!} - \frac{1}{3!} + ...$$

Scope of exponential series in algebra

All values of x