FAQs

1. Find the value of e^{-1}.

   Solution:

   According to the expansion of exponential function

   $e^{x} = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \ldots\ldots$ Now substitute -1 in the place of x, so we get

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

$$= 1 - \frac{1}{1} + \frac{1}{1\times 2} - \frac{1}{3\times 2\times 1} + \ldots\ldots$$

$$= \frac{1}{2} - \frac{1}{6} \text{ (neglecting higher factorials)}$$

$$= \frac{3-1}{6} = \frac{2}{6} = \frac{1}{3}$$

   Approximately $e^{-1`} = \frac{1}{3}$

2. What is the expansion of e^{ax}?

   Solution:

$$e^{ax} = 1 + \frac{ax}{1!} + \frac{(ax)^2}{2!} + \frac{(ax)^3}{3!} + \ldots\ldots\infty$$

$$= \sum_{n=0}^{\infty} \frac{(ax)^n}{n!}$$

3. Find the sum of the series $\sum_{n=0}^{\infty}\frac{n^2-n+1}{n!}$ is

Solution:

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

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

$$\therefore \sum_{n=0}^{\infty}T_n=\sum_{n=0}^{\infty}\frac{1}{(n-2)!}+\sum_{n=0}^{\infty}\frac{1}{n!}$$

$$=e+e=2e$$

4. State De Moiver's Theorem.

Solution:

De Moiver's theorem states that if 'n' is any integer, positive or negative then $(Cos\theta+iSin\theta)^n=Cosn\theta+iSinn\theta$ and if 'n' is a fraction positive or negative then $COsn\theta+iSinn\theta$ is one of the value of $(Cos\theta+iSin\theta)^n$.

5. Find the co-efficient of x^n in the expansion of e^{a+bx}

Solution:

$$e^{a+bx}=e^a.e^{bx}$$

$$=e^a\left[1+\frac{bx}{1!}+\frac{(bx)^2}{2!}+.....\frac{(bx)^n}{n!}+.....\infty\right]$$

So co-efficient of x^n in this expansion is

$$=\frac{e^a.b^n}{n!}$$