

Ex-5: Find the value of $x + \frac{2x}{2!} + \frac{3x}{3!} + \dots$

$$\text{Sol: } x + \frac{2x}{2!} + \frac{3x}{3!} + \dots = \frac{1x}{1!} + \frac{2x}{2} + \frac{3x}{3 \times 2!} + \frac{4x}{4 \times 3!} + \dots$$

$$= x \left(1 + \frac{1}{1!} + \frac{1}{2!} + \frac{1}{3!} + \dots \right)$$

$$= e \cdot x$$