

① Test the convergence of the following series

(i) $\frac{1}{2} + \frac{2x}{3} + \frac{3^2 x^2}{4^2} + \frac{4^3 x^3}{5^3} + \dots$

(ii) $1 + \frac{1}{(\log 2)^2} + \frac{1}{(\log 3)^3} + \frac{1}{(\log 4)^4} + \dots$

② Test the convergence of the series whose n^{th} term is

(i) $\frac{n+1}{n^2}$

(ii) $\tan^{-1} \frac{1}{n}$

③ $\frac{1}{1.2.3} + \frac{3}{2.3.4} + \frac{5}{3.4.5} + \dots$

④ $\frac{1}{2\sqrt{1}} + \frac{x^2}{3\sqrt{2}} + \frac{x^4}{4\sqrt{3}} + \frac{x^6}{5\sqrt{4}} + \dots$

⑤ $1 + \frac{3}{7}x + \frac{3.6}{7.10}x^2 + \frac{3.6.9}{7.10.13}x^3 + \dots$

⑥ $\frac{1}{(m+1)(m+2)} + \frac{1}{(m+2)(m+3)} + \frac{1}{(m+3)(m+4)} + \dots$

⑦ $1 + \frac{\alpha \cdot \beta}{1 \cdot \gamma} x + \frac{\alpha(\alpha+1) \beta(\beta+1)}{1 \cdot 2 \cdot \gamma(\gamma+1)} x^2 + \dots$