King Saud University Department Of Mathematics. College of Sciences.	First Mid-Term M.203 Differential and integral Calculus.	Summer semester We.15/10/1437H. Time: 90 Minutes.

Q. No. **1** Determine whether or not the following sequences are converge , if some of them are convergent find their limit..... [6]

$$\left\{2(-1)^n + \frac{\ln n}{\sqrt{n}}\right\}_{n=1}^{\infty} \quad , \quad \left\{(1+n)\sin(\frac{1}{n})\right\}_{n=1}^{\infty} \quad , \quad \left\{\frac{-2+\sin(2n)}{n^2+1}\right\}_{n=1}^{\infty}$$

Q. No. **2** Prove that the following series is convergent and find its sum..... .[4]

$$\sum_{n=1}^{\infty}\left[\frac{1}{3^n} + \frac{1}{(n+1)(n+2)}\right].$$

Q. No. **3** Determine whether the following series are absolutely convergent , conditionally convergent or divergent .....[8]

$$\sum_{n=2}^{\infty}(-1)^n \frac{\sqrt{n}}{2n-1} \quad , \quad \sum_{n=1}^{\infty}(-1)^{n+1}\frac{n^2}{(n)!} \quad , \quad \sum_{n=1}^{\infty}(-1)^n \frac{2n+3}{n+2}.$$

Q. No. **4** .....[7]

1) Find the interval and radius of convergence of the following series :

$$\sum_{n=1}^{\infty}(-1)^n \frac{n}{4^n}(x-2)^n .$$

2) Find the power series in x for $f(x) = \frac{1}{2+x}$ and its interval of convergence , deduce also the power series in x for the function $g(x) = \ln(x+2)$.

3) Deduce from 2) and at x=1 the following equation :

$$\ln(\frac{3}{2}) = \sum_{n=0}^{\infty}(-1)^n \frac{1}{2^{n+1}(n+1)}$$