

1. (20%) In the following determine whether the infinite series is (1) absolutely convergent, (2) conditionally convergent or (3) divergent. Make your answer in(1),(2) or (3). No reason is needed.

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

(b) $\sum_{n=1}^{\infty} \left(\frac{1}{n}\right)^e$

(c) $\sum_{n=3}^{\infty} \frac{\ln n}{n^2}$

(d) $\sum_{n=1}^{\infty} \frac{n}{2^n}$

(e) $\sum_{n=1}^{\infty} (-1)^n \frac{\sqrt{n}}{n+1}$

(f) $\sum_{n=1}^{\infty} \frac{\sqrt{n^3+2}}{n^4+3n^2+1}$

(g) $\sum_{n=3}^{\infty} \frac{1}{n\sqrt{\ln n}}$

(h) $\sum_{n=1}^{\infty} \frac{\sin n}{\sqrt{n^3+1}}$

(i) $\sum_{n=1}^{\infty} \frac{(-1)^n}{2n-1}$

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

2. (15%) Evaluate $\int_0^{\infty} \frac{e^{-\sqrt{x}}}{\sqrt{x}} dx$.

3. (15%) Find $\int \frac{2x^2+3x+7}{x^3+x^2-x-1} dx$.

4. (15%) Find $\int e^x \sin 2x dx$.

5. (10%) Evaluate $\int_0^1 \ln x dx$.

6. (10%) Find $\int \frac{1}{(4+x^2)^{3/2}} dx$.

7. (10%) Find $\int x^2 \sin x dx$.

8. (10%) Evaluate $\int_0^{\pi/2} \sin^3 x \cos^{1/2} x dx$.