

2/20 Exit Slip
Exemplar

I. $\sum_{n=1}^{\infty} \frac{(-1)^n}{n}$

① $\lim_{n \rightarrow \infty} \frac{1}{n} = \frac{1}{\infty} = 0$

② $\frac{1}{n} > \frac{1}{n+1}$ so $\frac{1}{2} > \frac{1}{3} > \frac{1}{4}$ so terms are decreasing!

\therefore This converges by the Alternating Series Test.

$\sum_{n=1}^{\infty} \left| \frac{(-1)^n}{n} \right| = \sum_{n=1}^{\infty} \frac{1}{n}$ This diverges by ~~the~~ p-series test
 $p=1$

So the original series converges conditionally.

II. $\sum_{n=1}^{\infty} \frac{(-1)^n}{n^3}$

① $\lim_{n \rightarrow \infty} \frac{1}{n^3} = \frac{1}{\infty} = 0$

② $\frac{1}{n^3} > \frac{1}{(n+1)^3}$ so $\frac{1}{1} > \frac{1}{2^3} > \frac{1}{3^3}$ so terms are decreasing

\therefore This converges by the Alternating Series Test

$\sum_{n=1}^{\infty} \left| \frac{(-1)^n}{n^3} \right| = \sum_{n=1}^{\infty} \frac{1}{n^3}$ This converges too by the p-series test
 $p=3 > 1$

So the original series converges absolutely.

III. $\sum_{n=1}^{\infty} \frac{(-1)^n}{\sqrt{n}}$

① $\lim_{n \rightarrow \infty} \frac{1}{\sqrt{n}} = \frac{1}{\sqrt{\infty}} = 0 \checkmark$

② $\frac{1}{\sqrt{n}} > \frac{1}{\sqrt{n+1}}$ so $\frac{1}{\sqrt{1}} > \frac{1}{\sqrt{2}} > \frac{1}{\sqrt{3}} > \frac{1}{\sqrt{4}}$ so terms are decreasing

∴ This series converges by the AST.

$$\sum_{n=1}^{\infty} \left| \frac{(-1)^n}{\sqrt{n}} \right| = \sum_{n=1}^{\infty} \frac{1}{\sqrt{n}} = \sum_{n=1}^{\infty} \frac{1}{n^{1/2}}$$

This diverges

since $p = 1/2$ which is

less than 1.

So the original series converges conditionally.

Ⓒ I & III only