

$$(29) \sum_{n=1}^{\infty} \frac{(-1)^n}{1+\sqrt{n}}$$

Converges

AST: ① each $u_n + \checkmark$

② $u_n \geq u_{n+1} \checkmark$

③ $\lim_{n \rightarrow \infty} \frac{1}{1+\sqrt{n}} = 0 \checkmark$

Conv. abs?

$$\sum_{n=1}^{\infty} \frac{1}{1+\sqrt{n}}$$

Compare to $\frac{1}{\sqrt{n}} = \frac{1}{n^{1/2}}$ diverges
P-Series
 $p < 1$

$$\text{LCT: } \lim_{n \rightarrow \infty} \frac{\frac{1}{1+\sqrt{n}}}{\frac{1}{\sqrt{n}}} = \lim_{n \rightarrow \infty} \frac{1}{1+\sqrt{n}} \cdot \frac{\sqrt{n}}{1} =$$

$$\lim_{n \rightarrow \infty} \frac{\sqrt{n}}{1+\sqrt{n}} = 1 \quad \text{So both diverge.}$$

Conditionally converges.

$$(31) \sum_{n=1}^{\infty} \frac{\cos n\pi}{n} \leftarrow \text{like } (-1)^n$$

AST: $\left. \begin{array}{l} \textcircled{1} \text{ each } u_n + \checkmark \\ \textcircled{2} u_n \geq u_{n+1} \checkmark \\ \textcircled{3} \lim_{n \rightarrow \infty} \frac{1}{n} = 0 \checkmark \end{array} \right\} \text{Converges}$

Conv abs?

$$\sum_{n=1}^{\infty} \left| \frac{\cos n\pi}{n} \right| \rightarrow \sum_{n=1}^{\infty} \frac{1}{n} \text{ , which diverges } p\text{-Series, } p=1.$$

SO Converges conditionally.

$$(35) \sum_{n=0}^{\infty} x^n = 1 + x + x^2 + x^3 + x^4 + \dots$$

a) Geometric with $r=x$.

Converges when $|x| < 1$

$$-1 < x < 1.$$

b) conv. abs on same interval $(-1, 1)$

c) nowhere cond. conv.

$$(39) \sum_{n=0}^{\infty} \frac{(x-2)^n}{10^n} = 1 + \frac{x-2}{10} + \frac{(x-2)^2}{10^2} + \frac{(x-2)^3}{10^3} + \dots$$

geometric with $r = \frac{x-2}{10}$

Converge when $\left| \frac{x-2}{10} \right| < 1$

$$-1 < \frac{x-2}{10} < 1$$

$$\begin{array}{ccc} -10 & < & x-2 & < & 10 \\ +2 & & +2 & & +2 \end{array}$$

$$-8 < x < 12$$

b) $(-8, 12)$

c) nowhere