Math

March 25th

alternating Series test

quiz recap

1 Intigral test – converges
2 comparison / P-test – converges
3 L.C.T – diverges
4 Ratio test – converges

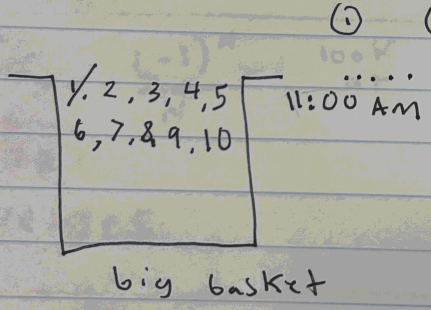
$$\sum_{N=1}^{\infty} a_N \qquad a_N > 0$$

alternating Harmonic series

$$1 - \frac{1}{2} + \frac{1}{3} - \frac{1}{4} + \frac{1}{5} - \frac{1}{6} + \frac{1}{7} - \frac{1}{8} \ldots = \ln 2 \ldots$$

$$\frac{1}{2}\ln 2 = \frac{1}{2} + \frac{1}{4} + \frac{1}{6} - \frac{1}{8} + \frac{1}{10}$$

the answer changes based on the order you add them



How many balls in basket at noon?

IN	
11:00 AM	1-10
11:30 AM	11-20
11:40	21-30
11:45	31-40
⋮	⋮

Out	
11:00 AM	1
11:30	2
11:40	3
11:45	4
⋮	⋮

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Absolute Convergence / conv. ABS.

$\sum_{n=1}^{\infty} a_N$ look at $\sum_{N=1}^{\infty} |a_N|$

$\sum_{N=1}^{\infty} |a_N|$ { int comp LCT Ratio Root } → converge then $\sum_{N=1}^{\infty} a_N$ conv. ABS.

$\sum_{n=1}^{\infty} \frac{(-1)^N}{N^2}$ Look at $\sum_{N=1}^{\infty} \left|\frac{(-1)^N}{N^2}\right| = \sum_{N=1}^{\infty} \frac{1}{N^2}$

$= \sum_{N=1}^{\infty} \frac{1}{N^2}$ $p=2>1$ conv. → conv. ABS.

$\sum_{N=1}^{\infty} \frac{(-1)^N}{N}$ look at $\sum_{N=1}^{\infty} \left|\frac{(-1)^N}{N}\right| = \sum_{N=1}^{\infty} \frac{1}{N}$

→ Diverges

Alternating Series Test (AST)

$\sum_{N=1}^{\infty} a_N$ a_N Alternate between pos and neg

If $\lim_{N\to\infty} a_N = 0$ (N^{th} term test) and $|a_{N+1}| < |a_N|$

and terms decrease Then Series converges conditionaly

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$$\sum_{N=1}^{\infty} \frac{(-1)^N}{N}$$

① $\lim_{N\to\infty} a_N = \lim_{N\to\infty} \frac{(-1)^N}{N} = 0$

② $|a_{N+1}| \;?\; |a_N| = \left|\frac{(-1)^{N+1}}{N+1}\right| < \left|\frac{(-1)^N}{N}\right|$

On the 122 website look for series flow chart

$$\sum_{N=2}^{\infty} \frac{(-1)^N}{\ln(N)}$$

① N^{th} term: $\lim_{N\to\infty} \frac{(-1)^N}{\ln(N)} = 0$

② Look at $\sum_{N=2}^{\infty} \left|\frac{(-1)^N}{\ln(N)}\right| = \sum_{N=2}^{\infty} \frac{1}{\ln N}$

③ $\frac{1}{\ln N} > \frac{1}{N}$ $\quad \sum \frac{1}{N}$ Div

④ $|a_{N+1}| \;?\; |a_N| \quad \left|\frac{(-1)^{N+1}}{\ln(N+1)}\right| < \left|\frac{(-1)^N}{\ln(N)}\right|$

→ converges conditionally