FEBRUARY 15:

Saturday Session 2/23 8:30

SWBAT:

DETERMINE IF A SERIES CONVERGES ABSOLUTELY

Absolute Convergence

if $\sum |a_n|$ converges

then $\sum a_n$ converges absolutely

Conditional Convergence

if $\sum |a_n|$ diverges

but $\sum a_n$ converges

then $\sum a_n$ converges conditionally

$\sum (-1)^n \frac{1}{n}$ converges

$\sum \left|(-1)^n \frac{1}{n}\right|$ diverges

$$\sum_{n=0}^{\infty} \frac{2(\sin x)^n}{n!+3}$$

$$e^x = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \frac{x^4}{4!} + \cdots$$

$$\left|\frac{2(\sin x)^n}{n!+3}\right|$$

Compare to $\left|\frac{2(\sin x)^n}{n!}\right|$ $\quad (\sin x)^n \frac{1}{n!} \cdot 2$

$$\left|\frac{2(\sin x)^n}{n!+3}\right| \le \left|\frac{2(\sin x)^n}{n!}\right| \le \left|\frac{1}{n!} \cdot 2\right|$$

$-1 \le \sin x \le 1$

$$\sum_{n=0}^{\infty} \frac{2}{n!} = 2 \sum_{n=0}^{\infty} \frac{1}{n!} = 2\Big(\underbrace{1 + 1 + \frac{1}{2} + \frac{1}{3!} + \frac{1}{4!} + \cdots + \frac{1}{n!} + \cdots}\Big)$$

$$= 2(e^1)$$

$\sum_{n=0}^{\infty} \frac{2}{n!}$ converges (to $2e$)

$\therefore \sum_{n=0}^{\infty} \left|\frac{2(\sin x)^n}{n!+3}\right|$ converges by DCT $\rightarrow \sum_{n=0}^{\infty} \frac{2(\sin x)^n}{n!+3}$ converges absolutely