Lab 10 Notes

$$a_k = \frac{(-1)^k 2^k}{k!} \qquad k \in \mathbb{N}$$

Ex. 1 $\quad a_4 = \frac{(-1)^4 2^4}{4!} = \frac{1 \cdot 16}{24}$

$$= \frac{16}{24}$$

Trouble

$$X \quad a_{1/2} = \frac{(-1)^{1/2} 2^{1/2}}{\left(\frac{1}{2}\right)!} \quad \text{(complex)}$$

$$a_{-3} = \frac{(-1)^{-3} 2^{-3}}{(-3)!}$$

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Series — infinite sum of terms in a sequence

$$\sum_{k=1}^{\infty} a_k \approx \sum_{k=1}^{n} a_k = S(n)$$

n^{th} partial sum

Geometric Series

$$\sum_{k=0}^{\infty} r^k$$

converges if

$$|r| < 1$$

start at 0

$$= \frac{1}{1-r}$$

$$\frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \frac{1}{16} + \cdots = 1$$

$$\frac{1}{2}\left[1 + \frac{1}{2} + \left(\frac{1}{2}\right)^2 + \left(\frac{1}{2}\right)^3 + \cdots\right] = 1$$

$$\frac{1}{2}\left[\sum_{k=0}^{\infty}\left(\frac{1}{2}\right)^k\right] = 1$$

$$= 2 = \frac{1}{1-\frac{1}{2}} \checkmark$$