

$$\begin{aligned}\sin x + \sin^2 x + \cos^3 x &= 0 \\ \sin x + 1 - \cos^2 x + \cos^3 x &= 0 \\ \sin x(1 + \sin x) + (1 - \sin^2 x)\cos x &= 0 \\ \sin x(1 + \sin x) + (1 + \sin x)(1 - \sin x)\cos x &= 0 \\ 1 + \sin x &= 0\end{aligned}$$

$$\begin{aligned}\sin x &= -1 \\ x &= -\frac{\pi}{2} + 2\pi k, k \in \mathbb{Z}\end{aligned}$$

$$\begin{aligned}\sin x + (1 - \sin x)\cos x &= t \\ \sin x + \cos x &= t \\ \sin x \cos x &= \frac{1}{2}(t^2 - 1)\end{aligned}$$

$$t - \frac{1}{2}t^2 + \frac{1}{2} = 0$$

$$\frac{1}{2}t^2 - t + \frac{1}{2} = 0$$

$$t = 1 \pm \sqrt{2}$$

$$\tan 2x = \frac{2 \tan x}{1 - \tan^2 x}$$

$$\sin \frac{x}{2} = \pm \sqrt{\frac{1 - \cos x}{2}}$$

$$\tan \frac{x}{2} = \frac{1 - \cos x}{\sin x} = \frac{\sin x}{1 + \cos x}$$

$$\begin{aligned}\cos 2x &= \cos^2 x - \sin^2 x \\ &= 2\cos^2 x - 1 \\ &= 1 - 2\sin^2 x\end{aligned}$$

$$\cos \frac{x}{2} = \pm \sqrt{\frac{1 + \cos x}{2}}$$

$$\sin 2x = 2 \sin x \cos x$$

$$\tan 2x = \frac{2 \tan x}{1 - \tan^2 x}$$

$$\therefore x = \pm \sqrt{1 - \cos x}$$

$$\sum_{n=1}^{\infty} \frac{\sqrt{3n+2}}{n!}$$

$$u_n = \frac{\sqrt{3n+2}}{n!}, u_{n+1} = \frac{\sqrt{3(n+1)+2}}{(n+1)!} = \frac{\sqrt{3n+5}}{(n+1)!}$$

$$\frac{\sqrt{3n+5}}{(n+1)!} = \lim_{n \rightarrow \infty} \frac{\sqrt{3n+5}n!}{n!(n+1)\sqrt{3n+2}}$$

$$= 0 < 1$$

$$\frac{\sqrt{3n+5}}{(n+1)!} \rightarrow 1, \frac{1}{n+1} \rightarrow 0$$

$$\frac{\sqrt{3n+5}n!}{(n+1)\sqrt{3n+2}}$$

$$\cos^2 x - \sin^2 x = \cos 2x$$

$$\frac{1 + \cos x}{2} = \cos^2 \frac{x}{2}$$



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