$$^{x}\underline{\mathfrak{S}} = {}^{x}\mathfrak{C}$$

$$^{x}\underline{\mathfrak{C}} = -{}^{x}\mathfrak{S}$$

$${}^{x}\mathfrak{S}^{2} + {}^{x}\mathfrak{C}^{2} = 1$$

$$\bigvee 0 < \pi < 4\text{:} \quad {}^{\pi/2}\mathfrak{C} = 0$$

$$m > 0 \Longrightarrow 0 \leqslant \overset{m}{(-1)} \left({}^{x}\mathfrak{C} - \sum_{n}^{m} \overset{n}{(-1)} \frac{x^{2n}}{(2n)!} \right) \leqslant \frac{x^{2m}}{(2m)!}$$

$$m = 1\text{:} \quad 0 \leqslant 1 - {}^{x}\mathfrak{C} \leqslant \frac{x^{2}}{2}$$

$$m = 2\text{:} \quad 0 \leqslant {}^{x}\mathfrak{C} - 1 + \frac{x^{2}}{2} \leqslant \frac{x^{4}}{24} \Longrightarrow {}^{x}\mathfrak{C} \leqslant 1 - \frac{x^{2}}{2} + \frac{x^{4}}{24}$$

$${}^{2}\mathfrak{C} \leqslant 1 - \frac{2^{2}}{2} + \frac{2^{4}}{24} = -\frac{1}{3}$$

$${}^{\pi/2}\mathfrak{S} = 1$$

$$1 = {}^{\pi/2}\mathfrak{S}^{2} + {}^{\pi/2}\mathfrak{C}^{2} = {}^{\pi/2}\mathfrak{S}^{2} \Longrightarrow {}^{\pi/2}\mathfrak{S} = \pm 1$$

$$x \geqslant 0\text{:} \quad m > 0 \Longrightarrow 0 \leqslant \overset{m}{(-1)} \left({}^{x}\mathfrak{S} - \sum_{n}^{m} \overset{n}{(-1)} \frac{x^{2n+1}}{(2n+1)!} \right) \leqslant \frac{x^{2m+1}}{(2m+1)!}$$

$$0 < x \leqslant 2\text{:} \quad m = 1\text{:} \quad 0 \leqslant x - {}^{x}\mathfrak{S} \leqslant \frac{x^{3}}{6}$$

$$\Longrightarrow 6\,{}^{x}\mathfrak{S} \geqslant 6x - x^{3} = \underbrace{6 - x^{2}}x = \underbrace{\sqrt{6} + x}\,\underbrace{\sqrt{6} - x}x > 0 \Longrightarrow 0 < {}^{\pi/2}\mathfrak{S} = 1$$

$$x+y_{\mathfrak{s}} = {}^{x}{}_{\mathfrak{s}}\, {}^{y}{}_{\mathfrak{c}} + {}^{x}{}_{\mathfrak{c}}\, {}^{y}{}_{\mathfrak{s}}$$

$$x+y_{\mathfrak{c}} = {}^{x}{}_{\mathfrak{c}}\, {}^{y}{}_{\mathfrak{c}} - {}^{x}{}_{\mathfrak{s}}\, {}^{y}{}_{\mathfrak{s}}$$

$$\frac{1}{2}\overbrace{x+y_{\mathfrak{s}} - {}^{x}{}_{\mathfrak{s}}{}^{y}{}_{\mathfrak{c}} - {}^{x}{}_{\mathfrak{c}}{}^{y}{}_{\mathfrak{s}}}^{2} + \overbrace{x+y_{\mathfrak{c}} - {}^{x}{}_{\mathfrak{c}}{}^{y}{}_{\mathfrak{c}} + {}^{x}{}_{\mathfrak{s}}{}^{y}{}_{\mathfrak{s}}}^{2}$$

$$= \overbrace{x+y_{\mathfrak{s}} - {}^{x}{}_{\mathfrak{s}}{}^{y}{}_{\mathfrak{c}} - {}^{x}{}_{\mathfrak{c}}{}^{y}{}_{\mathfrak{s}}}\underline{x+y_{\mathfrak{s}} - {}^{x}{}_{\mathfrak{s}}{}^{y}{}_{\mathfrak{c}} - {}^{x}{}_{\mathfrak{c}}{}^{y}{}_{\mathfrak{s}}} + \overbrace{x+y_{\mathfrak{c}} - {}^{x}{}_{\mathfrak{c}}{}^{y}{}_{\mathfrak{c}} + {}^{x}{}_{\mathfrak{s}}{}^{y}{}_{\mathfrak{s}}}\underline{x+y_{\mathfrak{c}} - {}^{x}{}_{\mathfrak{c}}{}^{y}{}_{\mathfrak{c}} + {}^{x}{}_{\mathfrak{s}}{}^{y}{}_{\mathfrak{s}}}$$

$$= \overbrace{x+y_{\mathfrak{s}} - {}^{x}{}_{\mathfrak{s}}{}^{y}{}_{\mathfrak{c}} - {}^{x}{}_{\mathfrak{c}}{}^{y}{}_{\mathfrak{s}}}\overbrace{x+y_{\underline{\mathfrak{s}}} - {}^{x}{}_{\underline{\mathfrak{s}}}{}^{y}{}_{\mathfrak{c}} - {}^{x}{}_{\underline{\mathfrak{c}}}{}^{y}{}_{\mathfrak{s}}} + \overbrace{x+y_{\mathfrak{c}} - {}^{x}{}_{\mathfrak{c}}{}^{y}{}_{\mathfrak{c}} + {}^{x}{}_{\mathfrak{s}}{}^{y}{}_{\mathfrak{s}}}\overbrace{x+y_{\underline{\mathfrak{c}}} - {}^{x}{}_{\underline{\mathfrak{c}}}{}^{y}{}_{\mathfrak{c}} + {}^{x}{}_{\underline{\mathfrak{s}}}{}^{y}{}_{\mathfrak{s}}}$$

$$= \underbrace{x+y_{\mathfrak{s}} - {}^{x}{}_{\mathfrak{s}}{}^{y}{}_{\mathfrak{c}} - {}^{x}{}_{\mathfrak{c}}{}^{y}{}_{\mathfrak{s}}}_{*}\ \underbrace{x+y_{\mathfrak{c}} - {}^{x}{}_{\mathfrak{c}}{}^{y}{}_{\mathfrak{c}} + {}^{x}{}_{\mathfrak{s}}{}^{y}{}_{\mathfrak{s}}}_{**} + \underbrace{x+y_{\mathfrak{c}} - {}^{x}{}_{\mathfrak{c}}{}^{y}{}_{\mathfrak{c}} + {}^{x}{}_{\mathfrak{s}}{}^{y}{}_{\mathfrak{s}}}_{**}\ \underbrace{{}^{x}{}_{\mathfrak{s}}{}^{y}{}_{\mathfrak{c}} + {}^{x}{}_{\mathfrak{c}}{}^{y}{}_{\mathfrak{s}} - x+y_{\mathfrak{s}}}_{-*} = 0$$

$$\implies \overbrace{x+y_{\mathfrak{s}} - {}^{x}{}_{\mathfrak{s}}{}^{y}{}_{\mathfrak{c}} - {}^{x}{}_{\mathfrak{c}}{}^{y}{}_{\mathfrak{s}}}^{2} + \overbrace{x+y_{\mathfrak{c}} - {}^{x}{}_{\mathfrak{c}}{}^{y}{}_{\mathfrak{c}} + {}^{x}{}_{\mathfrak{s}}{}^{y}{}_{\mathfrak{s}}}^{2} \underset{\text{cst}}{=} \overbrace{y_{\mathfrak{s}} - \underbrace{{}^{0}{}_{\mathfrak{s}}}_{=0}\, {}^{y}{}_{\mathfrak{c}} - \underbrace{{}^{0}{}_{\mathfrak{c}}}_{=1}\, {}^{y}{}_{\mathfrak{s}}}^{2} + \overbrace{y_{\mathfrak{c}} - \underbrace{{}^{0}{}_{\mathfrak{c}}}_{=1}\, {}^{y}{}_{\mathfrak{c}} + \underbrace{{}^{0}{}_{\mathfrak{s}}}_{=0}\, {}^{y}{}_{\mathfrak{s}}}^{2} = 0$$

$$x+\pi/2_{\mathfrak{s}} = {}^{x}{}_{\mathfrak{c}}$$

$$x+\pi/2_{\mathfrak{c}} = -\,{}^{x}{}_{\mathfrak{s}}$$

$$x+\pi/2_{\mathfrak{s}} = {}^{x}{}_{\mathfrak{s}}\, \underbrace{{}^{\pi/2}{}_{\mathfrak{c}}}_{=0} + {}^{x}{}_{\mathfrak{c}}\, \underbrace{{}^{\pi/2}{}_{\mathfrak{s}}}_{=1}$$

$$x+\pi/2_{\mathfrak{c}} = {}^{x}{}_{\mathfrak{c}}\, \underbrace{{}^{\pi/2}{}_{\mathfrak{c}}}_{=0} - {}^{x}{}_{\mathfrak{s}}\, \underbrace{{}^{\pi/2}{}_{\mathfrak{s}}}_{=1}$$

$$x+\pi_{\mathfrak{s}} = -\,{}^{x}{}_{\mathfrak{s}}$$

$$x+\pi_{\mathfrak{c}} = -\,{}^{x}{}_{\mathfrak{c}}$$

$$x+2\pi_{\mathfrak{s}} = {}^{x}{}_{\mathfrak{s}}$$

$$x+2\pi_{\mathfrak{c}} = {}^{x}{}_{\mathfrak{c}}$$