1)

$$\lim_{x\to 0} \frac{(\log(1-x)-x)^2 - 2\sin(2x^2+x^3))}{e^{-x^2} - \cos(\sqrt{2}x)}$$

Per $x \to 0$

$$\log(1-x) = -x - \frac{(-x)^2}{2} + \frac{(-x)^3}{3} + o(x^3) =$$

$$= -x - \frac{x^2}{2} - \frac{x^3}{3} + o(x^3)$$

QUINDI

$$(\log(1-x)-x)^2 = \left(-2x - \frac{x^2}{2} - \frac{x^3}{3} + o(x^3)\right)^2 =$$

$$(-2x)^2 + 2\cdot(-2x)\cdot\left(-\frac{x^2}{2}\right) + \left(-\frac{x^2}{2}\right)^2 + 2(-2x)\left(-\frac{x^3}{3}\right)$$

$$= 4x^2 + 2x^3 + \frac{x^4}{4} + \frac{4x^4}{3} + o(x^4)$$

INOLTRE

$$\sin(x) = x - \cancel{\frac{x^3}{6}} + \cancel{\frac{x^5}{120}} + \dots$$

$$\sin(2x^2+x^3) = (2x^2+x^3) + o(x^4)$$

$$e^{-x^2} = 1 - x^2 + \frac{(-x^2)^2}{2} + o(x^4) = 1 - x^2 + \frac{x^4}{2} + o(x^4)$$

$$\cos(\sqrt{2}x) = 1 - \frac{(\sqrt{2}x)^2}{2} + \frac{(\sqrt{2}x)^4}{24} + o(x^4) =$$

$$= 1 - \frac{\cancel{2}x^2}{\cancel{2}} + \frac{\cancel{4}x^4}{\cancel{24}_{6}} + o(x^4) = 1 - x^2 + \frac{x^4}{6} + o(x^4)$$

CONCLUDENDO

$$\frac{\left(\log(1-x)-x\right)^2 - 2\sin\left(2x^2+x^3\right)}{e^{-x^2}-\cos\left(\sqrt{2}x\right)} =$$

$$= \frac{4x^2+2x^3+\frac{x^4}{4}+\frac{4x^4}{3}+o(x^4)-2\left(2x^2+x^3+o(x^4)\right)}{\cancel{1}-\cancel{x^2}+\frac{x^4}{2}+o(x^4)-\cancel{1}+\cancel{x^2}-\frac{x^4}{6}+o(x^4)} =$$

$$= \frac{\cancel{4x^2}+\cancel{2x^3}+\frac{3x^4+16x^4}{12}+o(x^4)-\cancel{4x^2}-\cancel{2x^3}+o(x^4)}{\frac{3x^4-1x^4}{6}+o(x^4)} =$$

$$= \frac{\frac{19}{\cancel{12}}x^4+o(x^4)}{\frac{1}{\cancel{3}}x^4+o(x^4)} = \frac{\frac{19}{4}x^4+o(x^4)}{x^4+o(x^4)} \to \frac{19}{4}$$

---

4) a) $$\sum_{k=1}^{\infty} \frac{3\cdot 4^k - 2\cdot 5^k}{20^{k-1}}$$

$$\sum_{k=1}^{\infty} \frac{3\cdot 4^k - 2\cdot 5^k}{20^{k-1}} = \sum_{k=1}^{\infty}\left(3\,\frac{4^k}{20^{k-1}} - 2\cdot\frac{5^k}{20^{k-1}}\right) =$$

$$= \sum_{k=1} \left(3 \cdot \frac{4}{5^{k-1}} - 2 \cdot \frac{5}{4^{k-1}}\right) = \sum_{k=1} \left(\frac{12}{5^{k-1}} - \frac{10}{4^{k-1}}\right) =$$

$$= 12 \sum_{k=1}^{\infty} \left(\frac{1}{5}\right)^{k-1} - 10 \sum_{k=1}^{\infty} \left(\frac{1}{4}\right)^{k-1} =$$

$$= 12 \sum_{j=0}^{\infty} \left(\frac{1}{5}\right)^{j} - 10 \sum_{k=1}^{\infty} \left(\frac{1}{4}\right)^{j} \qquad (j = k-1)$$

$$= 12 \cdot \frac{1}{1-\frac{1}{5}} - 10 \cdot \frac{1}{1-\frac{1}{4}} = \frac{12}{1-\frac{1}{5}} - \frac{10}{1-\frac{1}{4}} =$$

$$= \frac{12 \cdot \left(1-\frac{1}{4}\right) - 10\left(1-\frac{1}{5}\right)}{\left(1-\frac{1}{5}\right)\left(1-\frac{1}{4}\right)} = \frac{12-3-10+2}{1-\frac{1}{4}-\frac{1}{5}+\frac{1}{20}} = \frac{1}{\frac{20-5-4+1}{20}} =$$

$$= \frac{1}{\frac{12}{20}} = \frac{\cancel{20}^{5}}{\cancel{12}_{3}} = \frac{5}{3}$$

b) $$\sum_{k=2}^{\infty} \frac{1}{k^2-1}$$

$$\frac{1}{k^2-1} = \frac{1}{(k-1)(k+1)} = \frac{A}{k-1} + \frac{B}{k+1} = \frac{A(k+1)+B(k-1)}{(k-1)(k+1)}$$

$$1 = A(k+1) + B(k-1)$$

$= A(k+1) + B(k-1)$

$1 = Ak + A + Bk - B$

$1 = (A+B)k + (A-B)$

$$\begin{cases} A+B=0 \\ A-B=1 \end{cases} \qquad \begin{cases} A=-B \\ -B-B=1 \end{cases} \qquad \begin{cases} A=\frac{1}{2} \\ B=-\frac{1}{2} \end{cases}$$

QUINDI

$$\frac{1}{k^2-1} = \frac{\frac{1}{2}}{k-1} - \frac{\frac{1}{2}}{k+1}$$

LA SOMMA PARZIALE PER $n \geq 3$ DIVENTA

$$S_n = \sum_{k=2}^{n} \frac{1}{k^2-1} = \frac{1}{2} \sum_{k=2}^{n} \left(\frac{1}{k-1} - \frac{1}{k+1} \right) =$$

$$= \frac{1}{2} \left(\sum_{k=2}^{n} \frac{1}{k-1} - \sum_{k=2}^{n} \frac{1}{k+1} \right) =$$

$$= \frac{1}{2} \left(\sum_{j=1}^{n-1} \frac{1}{j} - \sum_{j=3}^{n+1} \frac{1}{j} \right) = \frac{1}{2} \left(\left(1 + \frac{1}{2} + \cancel{\frac{1}{3}} + \cancel{\cdots} + \cancel{\frac{1}{n-2}} + \cancel{\frac{1}{n-1}} \right) - \left(\cancel{\frac{1}{3}} + \cancel{\frac{1}{4}} + \cancel{\cdots} + \frac{1}{n} + \frac{1}{n+1} \right) \right)$$

$j = k-1$ $\qquad$ $j = k+1$

$$= \frac{1}{2} \left(1 + \frac{1}{2} - \frac{1}{n} - \frac{1}{n+1} \right)$$

QUINDI

$$\sum_{k=2}^{\infty} \frac{1}{k^2-1} = \lim_{n\to\infty} S_n = \lim_{n\to\infty} \frac{1}{2} \left(1 + \frac{1}{2} - \overbrace{\frac{1}{n}}^{\to 0} - \overbrace{\frac{1}{n+1}}^{\to 0} \right) \to \frac{1}{2} \left(1 + \frac{1}{2} \right) =$$

$$\sum_{k=2} \frac{1}{k-1}$$

$$= \frac{1}{2} + \frac{1}{4} = \frac{2+1}{4} = \frac{3}{4}$$

---

5)

a) $$\sum_{k=1}^{\infty} \frac{1}{k^{1+\frac{1}{k}}} = +\infty$$

PER $k \to \infty$

$$\frac{1}{k^{1+\frac{1}{k}}} = \frac{1}{k + \underbrace{\sqrt[k]{k}}_{\to 1}} \sim \frac{1}{k}$$

QUINDI DATO CHE $\sum_{k=1}^{\infty} \frac{1}{k} = +\infty$, PER CONFRONTO ASINTOTICO,

ANCHE $\sum_{k=1}^{\infty} \frac{1}{k^{1+\frac{1}{k}}}$ DIVERGE A $+\infty$

b) $$\sum_{k=1}^{\infty} \frac{\sin\left(\frac{1}{k}\right)}{\lg(k^2+k+1)} = +\infty$$

PER $k \to \infty$

$$\frac{\sin\left(\frac{1}{k}\right)}{\lg(k^2+k+1)} \sim \frac{\frac{1}{k}}{\lg(k^2)} = \frac{1}{2k\lg(k)}$$

È DATO CHE

$$\sum_{k=2}^{\infty} \frac{1}{k^{\alpha}\lg(k)^{\beta}} = +\infty \qquad (\alpha = \beta = 1)$$

PER CONFRONTO ASINTOTICO ANCHE $\sum \frac{\sin\left(\frac{1}{k}\right)}{}$

Diverge a $+\infty$

c) $$\sum_{k=1}^{\infty} \frac{\sqrt{k^2+1}-k}{e^{-k}+\log^2(k)}$$

Per $k \to \infty$

$$\frac{\sqrt{k^2+1}-k}{e^{-k}+\log^2(k)} = \frac{k\left(\sqrt{\frac{k^2}{k^2}+\frac{1}{k^2}}-1\right)}{\log^2(k)\left(\frac{e^{-k}}{\log^2(k)}+1\right)} = \frac{k\left(\sqrt{1+\frac{1}{k^2}}-1\right)}{\log^2(k)\left(\frac{e^{-k}}{\log^2(k)}+1\right)} \sim$$

$$\sim \frac{\cancel{k}\cdot\frac{1}{k^{\cancel{2}}}}{\log^2(k)} = \frac{\frac{1}{k}}{\log^2(k)} = \frac{1}{k\log^2(k)}$$

Dato che

$$\sum_{k=1}^{\infty} \frac{1}{k\log^2(k)}$$ converge $(\alpha=1,\ \beta=2>1)$.

Anche $$\sum_{k=1}^{\infty} \frac{\sqrt{k^2+1}-k}{e^{-k}+\log^2(k)}$$ converge

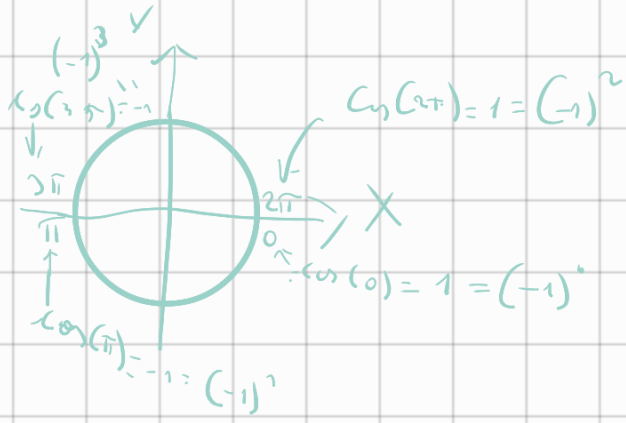
d) $$\sum_{k=1}^{\infty} k^k e^{-k^2}$$

Sia $a_k = k^k \cdot e^{-k^2}$, per $k \to \infty$

$$\sqrt[k]{a_k} = \left(k^k \cdot e^{-k^2}\right)^{\frac{1}{k}} = k \cdot \underbrace{e^{-k}}_{\to 0} \to 0 < 1$$

QUINDI LA SERIE CONVERGE PER IL CRITERIO DELLA RADICE

e) $$\sum_{k=0}^{\infty} \cos(\pi k) \arctan\left(\frac{1}{k}\right)$$



$$\cos(\pi k) = (-1)^k$$

INOLTRE

$\arctan\left(\frac{1}{k}\right)$ È DECRESCENTE PERCHÉ $\arctan(k)$ È UNA FUNZIONE DECRESCENTE E

$$\lim_{k \to \infty} \arctan\left(\frac{1}{k}\right) = 0$$

DUNQUE LA SERIE, PER IL CRITERIO DI LEIBNIZ, È CONVERGENTE

f) $$\sum_{k=1}^{\infty} \left(\sqrt{k^3+1} - \sqrt{k^3-1}\right)$$

PER $k \to \infty$

$$\sqrt{k^3+1} - \sqrt{k^3-1} = k^{\frac{3}{2}}\left(\sqrt{1+\frac{1}{k^3}} - \sqrt{1-\frac{1}{k^3}}\right) =$$

$$= k^{\frac{3}{2}}\left(\cancel{1} + \frac{1}{2k^3} + o\left(\frac{1}{k^3}\right) - \left(\cancel{1} - \frac{1}{2k^3} + o\left(\frac{1}{k^3}\right)\right)\right)$$

$$= k^{\frac{3}{2}}\left(\frac{\cancel{2}1}{\cancel{2}k^3} + o\left(\frac{1}{k^3}\right)\right) \sim \frac{k^{\frac{3}{2}}}{k^3} = \frac{1}{k^{3-\frac{3}{2}}} = \frac{1}{k^{\frac{6-3}{2}}} = \frac{1}{k^{\frac{3}{2}}}$$

PER IL CRITERIO DEL CONFRONTO ASINTOTICO,

DATO CHE $\sum_{k=1}^{\infty} \frac{1}{k^{3/2}}$ CONVERGE $\left(\alpha = \frac{3}{2}\right)$,

ANCHE LA SERIE DATA È CONVERGENTE

g) $\sum_{k=1}^{\infty} \frac{(k!)^2}{(2k)!}$

SIA $a_k = \frac{(k!)^2}{(2k)!} > 0$, ALLORA PER $k \to \infty$

$$\frac{a_{k+1}}{a_k} = \frac{((k+1)!)^2}{(2(k+1))!} \cdot \frac{(2k)!}{(k!)^2} = \frac{((k+1)\cancel{(k)!})^2}{(2k+2)(2k+1)\cancel{(2k)!}} \cdot \frac{\cancel{(2k)!}}{\cancel{(k!)^2}} =$$

$$= \frac{(k+1)^2}{(2(k+2)(2k+1)} = \frac{k^2+2k+1}{4k^2+6k+2} = \frac{\cancel{k^2}\left(1+\overbrace{\frac{2}{k}}^{\to 0}+\overbrace{\frac{1}{k^2}}^{\to 0}\right)}{\cancel{k^2}\left(4+\underbrace{\frac{6}{k}}_{\to 0}+\underbrace{\frac{2}{k^2}}_{\to 0}\right)} \to \frac{1}{4} < 1$$

QUINDI PER IL CRITERIO DEL RAPPORTO, LA SERIE CONVERGE

h) $\sum_{k=1}^{\infty} \frac{1}{2^{\log(k)}}$

SI HA

$$\frac{1}{2^{\log(k)}} = \frac{1}{\exp(\log(k) \cdot \log(2))} = \frac{1}{\left(\cancel{e}^{\cancel{\log}(k)}\right)^{\ln(2)}} = \frac{1}{k^{\log(2)}}$$

è DATO CHE $\alpha = \log(2) < 1$, LA SERIE DIVERGE A $+\infty$

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6) a) $\displaystyle\sum_{k=0}^{\infty} \frac{1}{k!} = e \rightarrow$ CALCOLANDO $\displaystyle\sum_{k=0}^{\infty} \frac{k}{k!}$ e $\displaystyle\sum_{k=0}^{\infty} \frac{k^2}{k!}$

PRIMA SERIE:

$$\sum_{k=0}^{\infty} \frac{k}{k!} = \sum_{k=1}^{\infty} \frac{k}{k!} = \sum_{k=1}^{\infty} \frac{\cancel{k}}{\cancel{k}(k-1)!} = \sum_{k=1}^{\infty} \frac{1}{(k-1)!} = \sum_{j=0}^{\infty} \frac{1}{j!} = e$$

PERCHÉ:

$$\underbrace{\frac{0}{1} + \frac{1}{1} + \frac{2}{2} + \frac{3}{6} + \dots + \frac{k}{k!}}_{\sum_{k=0}^{\infty} \frac{k}{k!}} = \underbrace{\frac{1}{1} + \frac{2}{2} + \frac{3}{6} + \dots + \frac{k}{k!}}_{\sum_{k=1}^{\infty} \frac{k}{k!}}$$

SECONDA SERIE:

$$\sum_{k=0}^{\infty} \frac{k^2}{k!} = \sum_{k=0}^{\infty} \frac{k^2 - k + k}{k!} = \sum_{k=0}^{\infty} \frac{\overbrace{k(k-1)}^{k^2-k}}{k!} + \sum_{k=0}^{\infty} \frac{\overbrace{k}^{k}}{k!} =$$

$$= \sum_{k=0}^{\infty} \frac{\cancel{k(k-1)}}{\cancel{k}\cdot\cancel{(k-1)}(k-2)!} + e = \sum_{k=2}^{\infty} \frac{1}{(k-2)!} + e = \sum_{j=0}^{\infty} \frac{1}{k!} + e = e + e = 2e$$

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2) b) $\displaystyle\int_0^1 \frac{\log(x+3)}{\sqrt{x}}\, dx$:

$t = \sqrt{x}$, $t^2 = x$, $2t\,dt = dx$

$$2\cdot\int_0^1 \log(x+3)\, d(\sqrt{x}) = 2\left[\log(x+3)\cdot\sqrt{x}\right]_0^1 - 2\int \frac{\sqrt{x}}{x+3}\,dx =$$

$$= 2\left(\log(4)\cdot 1 - \log(3)\cdot 0\right) - 2\int_0^1 \frac{t}{t^2+3}\cdot 2t\,dt =$$

$$= 2\log(4) - 4\int_0^1 \frac{t^2 \overset{+3}{-3}}{t^2+3}\,dt =$$

$$= 2\log(4) - 4\int_0^1 \left(\cancel{\frac{t^2+3}{t^2+3}} - \frac{3}{t^2+3}\right)dt =$$

$$= 2\log(4) - 4\left(\int_0^1 dt - 3\int \frac{1}{t^2+3}\,dt\right) =$$

$$= 2\log(4) - 4[x]_0^1 + 12\left[\frac{1}{\sqrt{3}}\cdot \arctan\left(\frac{t}{\sqrt{3}}\right)\right]_0^1 =$$

$$= 2\log(4) - 4 + \cancel{12}^{\,2}\left(\left(\frac{1}{\sqrt{3}}\cdot\frac{\pi}{\cancel{6}}\right) - \cancel{\left(\frac{1}{\sqrt{3}}\cdot 0\right)}\right) =$$

$$= 2\log(4) - 4 + \frac{2\pi}{\sqrt{3}}$$

c) $$\int_0^{+\infty} \frac{x+5}{(x+3)(x^2+3x+2)}\,dx$$

ABBIAMO CHE

$$\frac{x+5}{(x+3)(x^2+3x+2)} = \frac{x+5}{(x+3)(x+1)(x+2)} = \frac{A}{(x+3)} + \frac{B}{(x+1)} + \frac{C}{(x+2)} =$$

$(x+3)(x^2+3x+2)$ $\quad (x+3)(x+2)(x+1)$ $\quad (x+3)$ $\quad (x+2)$ $\quad (x+1)$

$$A = \lim_{x \to -3} \frac{x+5}{(x+2)(x+1)} = \frac{2}{(-1)(-2)} = 1$$

$$B = \lim_{x \to -2} \frac{x+5}{(x+3)(x+1)} = \frac{3}{-1} = -3$$

$$C = \lim_{x \to -1} \frac{x+5}{(x+3)(x+2)} = \frac{4}{2} = 2$$

QUINDI

$$\int_0^{+\infty} \frac{x+5}{(x+3)(x^2+3x+2)}\,dx = \int_0^{+\infty} \left(\frac{1}{x+3} - \frac{3}{x+2} + \frac{2}{x+1} \right) dx =$$

$$= \Big[\log|x+3| - 3\log|x+2| + 2\log|x+1| \Big]_0^{+\infty} =$$

$$= \left[\log\left(\frac{(x+3) + (x+1)^2}{(x+2)^3} \right) \right]_0^{+\infty} =$$

c) $\displaystyle\int_0^{+\infty} \frac{1}{\sqrt{x}+x^2}\,dx$

$t=\sqrt{x}$, $t^2=x$, $2t\,dt=dx$

$$\int_0^{+\infty} \frac{1}{\sqrt{x}+x^2}\,dx = \int_0^{+\infty} \frac{1}{\cancel{t}+t^{\cancel{4}\,3}}\,2\cancel{t}\,dt =$$

$$= 2\int_0^{+\infty} \frac{1}{t^3+1}\,dt$$

ora

$t^3+1 = (t+1)(t^2-t+1)$

$$\frac{1}{t^3+1} = \frac{A}{t+1} + \frac{Bx+C}{t^2-t+1} = \frac{A(t^2-t+1)+(Bt+C)(t+1)}{(t+1)(t^2-t+1)} \Rightarrow$$

$$\Rightarrow At^2 - At + A + Bt^2 + Bt + Ct + C = 1$$

$$(A+B)t^2 + (-A+B+C)t + (A+C) = 1$$

$$\begin{cases} A+B=0 \\ -A+B+C=0 \\ A+C=1 \end{cases} \qquad \begin{cases} A=-B \\ B+B+C=0 \\ -B+C=1 \end{cases} \qquad \begin{cases} A=-B \\ B=-\frac{C}{2} \\ +\frac{C}{2}+C=1 \end{cases}$$

$$\begin{cases} A=\frac{1}{}\end{cases}$$

$$\begin{cases} A = \frac{1}{3} \\ B = \left(-\frac{2}{3}\right) \cdot \frac{1}{2} = -\frac{1}{3} \\ C = \frac{2}{3} \end{cases}$$

QUINDI

$$\frac{1}{t^3+1} = \frac{1}{3} \cdot \frac{1}{t+1} - \frac{-\frac{1}{3} \cdot t + \frac{2}{3}}{t^2-t+1} =$$

$$= \frac{1}{3} \cdot \frac{1}{t+1} - \frac{1}{3} \cdot \frac{t-2}{t^2-t+1} =$$

$$= \frac{1}{3} \left(\frac{1}{t+1} - \frac{t-2}{t^2-t+1} \right)$$

QUINDI

$$2 \int_0^{+\infty} \frac{1}{t^3+1} = \frac{2}{3} \left(\int_0^{+\infty} \frac{1}{t+1} \, dt - \int_0^{+\infty} \frac{t-2}{t^2-t+1} \, dt \right)$$

INOLTRE SE $s = t - \frac{1}{2}$ ALLORA

$$\int_0^{+\infty} \frac{t-2}{t^2-t+1} \, dt = \int_0^{+\infty} \frac{s - \frac{3}{2}}{s^2 + \frac{3}{4}} \, ds =$$

$$= \int_0^{+\infty} \frac{s}{s^2 + \frac{3}{4}} \, ds - \frac{3}{2} \int_0^{+\infty} \frac{1}{s^2 + \frac{3}{4}} \, ds =$$

$$= \left[\ln \sqrt{s^2 + \frac{3}{4}} \right]_0^{+\infty} - \left[\sqrt{3} \arctan\left(\frac{2s}{\sqrt{3}} \right) \right]_0^{+\infty} =$$

$$= \frac{1}{2}\left[\log(t^2+t+1)\right]_0^{+\infty} - \left[\sqrt{3}\,\arctan\left(\frac{2t-1}{\sqrt{3}}\right)\right]_0^{+\infty}$$

QUINDI

$$\int_0^{+\infty} \frac{1}{\sqrt{x}+x^2} = \frac{2}{3}\left[\log(t+1) - \frac{1}{2}\log(t^2-t+1) + \sqrt{3}\,\arctan\left(\frac{2t-1}{\sqrt{3}}\right)\right]_0^{+\infty} =$$

$$= \frac{2}{3}\left(\frac{\sqrt{3}\,\pi}{2} + \frac{\sqrt{3}\,\pi}{6}\right) = \frac{4\pi}{3\sqrt{3}}$$

---

3) a) $$\int_0^{\frac{\pi}{2}} \frac{\sqrt{\sin(x)(1-\sin(x))}}{\tan^{\alpha}(x)\cos^2(x)}\,dx$$

DOMINIO:

$$\begin{cases} \tan^{\alpha}(x)\cdot\cos^2(x) \neq 0 \\ \sin(x)\cdot(1-\sin(x)) \geq 0 \\ x \neq \frac{\pi}{2} + k\pi \end{cases}$$

CIA

$$f(x) = \frac{\sqrt{\sin(x)(1-\sin(x))}}{\tan^{\alpha}(x)\cos^2(x)}$$

$$\begin{cases} x \neq 0 \\ \forall x \in \mathbb{R} \\ x \neq \frac{\pi}{2} + k\pi \end{cases}$$

NELL'INTERVALLO $(0, \frac{\pi}{2})$ CI SONO 2 PUNTI DI INTERESSE:

0^+ E $\left(\frac{\pi}{2}\right)^-$

PER $x \to 0^+$

$$f(x) \sim \frac{x^{\frac{1}{2}}}{x^{\alpha}} \sim \frac{1}{x^{\alpha-\frac{1}{2}}}$$

PER LA CONVERGENZA, $\alpha - \frac{1}{2} < 1$ OSSIA $\alpha < \frac{3}{2}$

PER $x \to \left(\frac{\pi}{2}\right)^-$

SI HA CHE $t = \frac{\pi}{2} - x \to 0^+$, $\sin(x) = -\cos(t)$, $\cos(x) = \sin(t)$,

$\tan(x) = \frac{1}{\cot(t)}$

E

$$f(x) \sim \frac{(1-\cos(t))^{\frac{1}{2}}}{\tan^{-\alpha}(t)\,\sin^{\alpha}(t)} \sim \frac{\left(\frac{t^2}{2}\right)^{\frac{1}{2}}}{t^{2-\alpha}} = \frac{2^{-\frac{1}{2}}}{t^{1-\alpha}}$$

PER LA CONVERGENZA, $1-\alpha < 1$ OSSIA $\alpha > 0$

COSÌ L'INTEGRALE IMPROPRIO DATO È CONVERGENTE

SE E SOLO SE $0 < \alpha < \frac{3}{2}$