

$$a) \int_0^{+\infty} \frac{4x}{4x^8 + 1} dx$$

l'intervallo di definizione è  $[0, +\infty)$

il punto da considerare è  $+P$

Più  $x \rightarrow +\infty$

$$\frac{4x}{4x^8 + 1} \sim \frac{x}{x^8} = \frac{1}{x^7}$$

Sarà che  $f \rightarrow 0$ , cioè  $\lim_{x \rightarrow \infty} f(x) = 0$

Confrontando questo con il criterio di convergenza

convergenza

$$b) \int_0^2 \frac{\operatorname{ord}\left(\frac{1}{\sqrt[3]{x}}\right)}{x^\alpha} dx$$

$\Sigma_A$

$$f(x) = \frac{\operatorname{ord}\left(\frac{1}{\sqrt[3]{x}}\right)}{x^\alpha}$$

la funzione positiva in  $(0, 1]$

16) PUNTO 9) VERIFICAR:  $\bar{c} = 0^+$

POR  $x \rightarrow 0^+$

$$f(x) \sim \operatorname{and}_n\left(\frac{1}{x}\right) = \frac{\frac{\pi}{n}}{x}$$

CHI CONVERGE SOLO SI AL CA

QUERIDA PUNTO 11) CONVERGENZA DE LOS ASINTOTAS

L'IRREGULARIDAD PARCIAL CONVERGE SOLO SI  
SOLAMENTE SI  $a < 1$

$$\text{i)} \int_1^{+\infty} \frac{\operatorname{and}_n\left(\frac{1}{x}\right)}{x^n} dx$$

SIA

$$f(x) = \underbrace{\operatorname{and}_n\left(\frac{1}{x}\right)}_{x^n}$$

LA EXPONENTE ES POSITIVO EN  $[1, +\infty)$

16) PUNTO 9) IRREGULARIDAD + S

POR  $x \rightarrow +\infty$

$$f(x) \sim \frac{\frac{1}{\sqrt{x}}}{x^{\alpha}} = \frac{1}{x^{\alpha+\frac{1}{2}}}$$

E' convergente solo se  $\alpha + \frac{1}{2} < 0 \Leftrightarrow \alpha < -\frac{1}{2}$

Aumentare per il criterio delle confronto a simile ricco,

L'integrale di partendo da convergente solo se  $\alpha < -\frac{1}{2}$

---

$$\text{d) } \int_0^4 \frac{(e^x - 1)^\alpha}{e^x - e^{-x}} dx$$

Sia

$$F(x) = \frac{(e^x - 1)^\alpha}{e^x - e^{-x}}$$

La funzione è positiva per  $x \in [0, 4]$

Il punto di controllo per è 0

Per  $x \rightarrow 0^+$

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

Quindi l'insieme si  $x > 0$

Alcune C.E.R. IL Calcolo dei confronti assintotici

Per le funzioni continue per  $x \rightarrow \infty$

---

e)  $\int_2^{+\infty} \frac{(e^x - 1)^{\alpha}}{e^x - e^{-x}} dx$

Sia

$$f(x) = \frac{(e^x - 1)^{\alpha}}{e^x - e^{-x}}$$

La curva è positiva in  $[2, +\infty)$

Ora si dimostra che  $f(x)$  è continua per  $x \rightarrow +\infty$

Più  $x \rightarrow +\infty$

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

Quindi converge se  $\alpha - 1 < 0$  ossia  $\alpha < 1$

Così per le calcolate gli confronti assintotici  
intercalati imposti confronti se  $\alpha < 1$

$$f) \int_{1}^{+\infty} \frac{(x+2)(x-1)^2}{x(x^4-1)^{\alpha}} dx$$

51 A

$$f(x) = \frac{(x+2)(x-1)^2}{x(x^4-1)^{\alpha}}$$

L\_A For  $\alpha > 0$  the function is positive in  $(1, +\infty)$

|  $\lim_{x \rightarrow 1^+}$   $f(x)$  does not exist at  $x=1$  because  $f(x) \rightarrow +\infty$

For  $x \rightarrow +\infty$

$$f(x) \sim \frac{x \cdot x^2}{x \cdot x^{4\alpha}} = \frac{x^3}{x^{4\alpha+1}} = \frac{1}{x^{4\alpha-1}}$$

Since  $4\alpha - 1 > 1$  converges to 0

$$\text{Ossia } \alpha > \frac{1}{4}$$

For  $x \rightarrow 1^+$

$$f(x) \sim \frac{(x-1)^2}{4^{\alpha}(x-1)^{\alpha}} = \left(\frac{3}{4}\right) \frac{1}{(x-1)^{\alpha-2}}$$

Definir  $\rho$  en  $C_2$  como  $\rho(x) = \rho(x)$

$$C_1: \alpha - 2 < 1 \rightarrow \alpha < 3$$

Alguna  $\zeta'$  en  $C_1$  es  $(1, +\infty)$

Continuidad solo en soluciones de

$$\frac{3}{4} < \alpha < 1$$

---

$$g) \int_0^{+\infty} \frac{1 - e^{-\frac{1}{n+x-1}}}{\sqrt[n]{x |\log(x)|}} dx$$

Síntesis

$$f(x) = \frac{1 - e^{-\frac{1}{n+x-1}}}{\sqrt[n]{x |\log(x)|}}$$

La función es positiva en  $(0, 1) \cup (1, +\infty)$

1 punto de corte en  $x = n+1$ ,  $0^+, 1, +\infty$

Para  $x \rightarrow 0^+$

$$f(x) \sim \frac{1 - e^{-\frac{1}{n+x-1}}}{\sqrt[n]{|\log(x)|}}$$

Quando  $\alpha = \frac{1}{2}$   $C_1$

Lei de Condicionamento da Convexidade para un

informações, se  $\delta^+$  é sólida para planos ou a

plan  $x \rightarrow 1$

$$R(x) = \frac{1 - e^{-\frac{1}{1+x}}}{\sqrt{x} |\log(1 + (x-1))|^{\alpha}} \sim \frac{1 - e^{-\frac{1}{x}}}{|x-1|^{\alpha}}$$

Quando Lei de Condicionamento da Convexidade

Plan un informado se  $\delta^+$  é sólida para um

plan  $x \rightarrow \infty$

$$R(x) \sim \frac{\frac{1}{1+x^2}}{x^{\frac{1}{\alpha}} |\log(x)|^{\alpha}} \sim \frac{1}{x^{\frac{1}{\alpha}} x^{\frac{1}{\alpha}} |\log(x)|^{\alpha}} =$$

$$= \frac{1}{x^{\frac{2}{\alpha}} |\log(x)|^{\alpha}}$$

Dato  $C_{H_0}$   $\frac{t}{\tau} > \alpha$   $L_p$   $C_{0,1} + 1 =$

Si  $S_{0,1} \neq 0$  A  $P(E) = 0$

Ir  $C_{0,1}$  us  $\alpha$   $L_p$   $C_{0,1} = 0$

Convención se  $\alpha$   $L_p$   $S_{0,1} = 0$

---

$$d) \int_0^{\frac{\pi}{2}} \frac{\sqrt{\lambda_{ir}(x)(1-\gamma_{ir}(x))}}{\sin^2(x) - \cos(x)} dx$$

$S_{1,1}$

$$f(x) = \frac{\sqrt{\lambda_{ir}(x)(1-\gamma_{ir}(x))}}{\sin^2(x) - \cos(x)}$$

La función es  $\in$   $\text{positiva}$  en  $(0, \frac{\pi}{2})$

1 punto de contraste sea  $0 \in (0, \frac{\pi}{2})$

para  $x \rightarrow 0^+$

$$f(x) = \frac{x^{\frac{1}{2}}}{x^{0.5}} = \frac{1}{x^{0.5}}$$

QUIRRI PUNCA CONVERGENZA OR <  $\frac{3}{2}$

$$\text{PUNCA } X + \left(\frac{\pi}{2}\right)^-, t = \frac{\pi}{2} - X \rightarrow 0^+,$$

$$\sin(x) = -\cos(\pi/2 - x), -\cos(x) = \sin(\pi/2 - x)$$

$$\tan(x) = \frac{1}{\cos(\frac{1}{x})}$$

l'

$$f(x) \sim \frac{(1 - \cos(\epsilon))^{1/2}}{\tan^{-\alpha}(\epsilon) \approx(t)} \sim \frac{\left(\frac{\epsilon^2}{2}\right)^{1/2}}{t^{-\alpha+1/2}} =$$

$$\frac{t}{\sqrt{t^{-\alpha+1}}} = \frac{(\sqrt{t})^{-1}}{t^{-\alpha+1}}$$

PUNCA CONVERGENZA - OR < 1 > 0 > 0

COSI' LINEARIZZAZIONE DINTO C' CONVERGENZA

SF C SUGLI SI OCCORRE  $\frac{3}{2}$

b)  $\cap \frac{\pi}{2}$

$$y = \int_{\frac{\pi}{4}}^x \frac{t_{\text{out}}(x)}{(t_{\text{in}}(x) - t)^n} dt$$

Since

$$f(x) = \frac{t_{\text{out}}(x)}{(t_{\text{in}}(x) - t)^n} = \frac{f_{\text{out}}(x)}{(t_{\text{out}}(x) + \gamma)^n (t_{\text{in}}(x) - \gamma)^n}$$

Let  $\gamma = \text{constant}$  for  $t \in [0, \frac{\pi}{4}]$

Let  $t = \text{position}$  then  $t \in [0, \frac{\pi}{4}]$  and  $x \in [\frac{\pi}{4}, \frac{\pi}{2}]$

$$\text{Plan } x \rightarrow \left(\frac{\pi}{4}\right)^+$$

$$t = \frac{\pi}{4} - x \rightarrow 0^+$$

$$f(x) \sim \frac{1}{\gamma^n (2t)^\alpha} = \frac{1}{\frac{1}{4}^\alpha t^\alpha}$$

$$t_{\text{out}}(x) = t_{\text{out}}\left(\frac{\pi}{4}\right) + t_{\text{out}}'\left(\frac{\pi}{4}\right)\left(x - \frac{\pi}{4}\right) + o\left(x - \frac{\pi}{4}\right)$$

$$= 1 + 2t + o(t)$$

Pinch  $\zeta_2$  converges if  $\alpha < 1$

$$\text{Pinch } X \rightarrow \left(\frac{\pi}{2}\right)^+$$

so HA C.I.  $t = \frac{\pi}{2} - X \rightarrow 0^+$ ,

$$t^{-\alpha}(X) = \frac{1}{t^{-\alpha}(t)} \sim \frac{1}{t}$$

$$f(X) \sim \frac{t^{-1}}{(t^{-2}-1)^\alpha} \sim \frac{t}{t \cdot t^{-2\alpha}} = \frac{1}{t^{2\alpha-1}}$$

Pinch  $\zeta_2$  convergence  $\rightarrow 2\alpha + 1 < 1 \rightarrow \alpha < 0$

Quindi la parte di  $\zeta$  converge

Converge solo se multanzo 1.

$$0 < \alpha < 1$$

---

$$\text{d) } \int_{-\infty}^{\infty} \sqrt{x+2} \log(x+2) dx$$

$$\int_0^s \frac{1}{(6+x-x^2)^{0.5}}$$

$S_{1,2}$

$$f(x) = \frac{\sqrt{x+2} \log(x+2)}{(6+x-x^2)^{0.5}} = \frac{\log(x+2)}{(3-x)^{0.5} (x+2)^{0.5}}$$

La curva es de la positiva en  $[0, 3]$

el punto controlador es 3

en  $x \rightarrow 3$ ,  $f = 3 - x \rightarrow 0^+$  (-)

$$R(x) \sim \frac{\log(s)}{t^{0.5} \cdot s^{0.5}} = \frac{C}{t^{0.5}}$$

Integración Convexidad

solo C si  $t \approx 1$  o  $< 1$

$$d) \int_0^1 \frac{|\ln(x) - \log(1+2x)|}{x^2(\sqrt{1+x} + \sqrt{x}-2)} dx$$

$S_{1,2}$

$$f(x) = |\ln(x) - \log(1+2x)|$$

$$x^2(\sqrt{1+x} + \sqrt{x} - 2)$$

$L^2$  sum of squares of  $\rho_{\text{approx}}$  in  $(0, 1]$

0.1 period in  $\rho_{\text{approx}}$  or  $\text{Convergence is 0+}$

then  $x \rightarrow 0+$

$$\begin{aligned} f(x) &= \frac{|\log x + o(x^2) - (x - x^2 + o(x^2))|}{x^2 \left( x \left( x + \frac{\cancel{x}}{x} + o(x) \right) + x^2 - 1 \right)} = \\ &= \frac{|(a_1 - 1)x + x^2 + o(x^2)|}{x^2 \left( \frac{x}{4} + o(x) + x^{\frac{1}{2}} \right)} \end{aligned}$$

Quotient rule  $a \neq 2$

$$f(x) \sim \frac{2x}{x^{\frac{1}{2}} \cdot x^{\frac{1}{2}}} = \frac{2}{x^{\frac{1}{2}}}$$

$L'$  in  $\pi$ -Race (Computer). So  $\int$

$a \neq 2$

$$1) \int_{-\infty}^{+\infty} \frac{\log^2(x)}{C + x^2} dx$$

$$\int_1^\infty (x-1)^\alpha \log^{\beta}(1+x^\gamma)$$

Si

$$f(x) = \frac{\log^{\beta}(cx)}{(x-1)^\alpha \log^{\gamma}(1+x^\delta)}$$

La función es continua en  $(1, +\infty)$

Obligatoriamente para analizar el comportamiento

en  $x = +\infty$

Pienso  $x \rightarrow 1^+$ ,  $t = 1-x \rightarrow 0$

$$f(x) \sim \frac{\log^{\beta}(t+\alpha)}{(-t)^\alpha \log^{\gamma}(\alpha)} = \frac{t^\beta}{t^\alpha} \cdot C = \frac{C}{t^{\alpha-\beta}}$$

Pienso la continuidad ( $\Rightarrow$ ) en  $x=1$  o sea

Pienso  $x \rightarrow +\infty$

$$f(x) \sim \frac{\log^{\beta}(x)}{x^\alpha \log^{\gamma}(x)} = \frac{\log^{\beta}(x)}{x^\alpha \cdot x^\beta \cdot \log^{\gamma}(x)} = \frac{1}{x^{\alpha+\beta} \cdot \log^{\gamma}(x)}$$

Pienso la continuidad ( $\Rightarrow$ )  $\alpha+\beta \geq 1$  o sea  $\alpha \geq -\beta$

QUINTA LINHA DE INTEGRACAO CONVENCIONAL S.1)

U SOLUÇÃO SE  $-4 \leq x \leq 4$

---

$$\int_0^{+\infty} \frac{\operatorname{ord} r(x^*)}{x^* \lg^*(1+x^*)} dx$$

S1A

$$R(x) := \frac{\operatorname{ord} r(x^*)}{x^* \lg^*(1+x^*)}$$

ALGUNAS LAS FUNCIONES SON PRIMITIVAS EN

(0, +∞) | PUES SON IRREDUCIBLES SOLO

0+ U +∞

POR  $x \rightarrow 0^+$

$$R(x) \sim \frac{x^8}{x^* \cdot (x^*)^2} = \frac{1}{x^{\alpha+6.8}} = \frac{1}{x^{\alpha-2}}$$

OSSIAN SOLO SI  $0 < \alpha < 3$

Rim  $x \rightarrow +\infty$

$$f(x) \sim \frac{\frac{\pi}{2}}{x^\alpha \log^2(x)} \sim \frac{\frac{\pi}{2}}{x^{1.5} \log^2(x)} =$$

$$= \frac{\pi}{18} \cdot \frac{1}{x^\alpha \log^2(x)}$$

Quindi conviene solo se  $\alpha \geq 1$

Allora l'intera grazie impiego conviene

solo se  $\alpha > 1$

---

$$\int_0^{\frac{\pi}{2}} \frac{\sin^2(x)}{(1 - \cos^2(x))^\alpha}$$

SIA

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

ALL CON<sub>A</sub> LT FURTHERMORE C POSITIVE ~

$\left(0, \frac{\pi}{2}\right]$ . ONLY LC PROB PA LTD & LIM

i 6+

PROVE  $x \geq 0^+$

$$f(x) \sim \frac{x^2}{\left(1 - \left(1 - \frac{x^2}{2}\right)\right)^{1/2}} = \frac{x^2}{\left(x - 1 + \frac{x^2}{2}\right)^{1/2}} =$$

$$= \frac{x^2}{x^{1/2}} \cdot 2 = 2 \cdot \frac{1}{x^{1/2}}$$

QUIRKS OF DISTRIBUTIVE PROPERTY CONVERSE

SOLVE FOR SOLUTIONS OF  $2a - 2 < 1$  ONLY A

$$8V \quad a < \frac{3}{2}$$

0 T

1

$$f(x) \sim \frac{\operatorname{and}_r(\sqrt{\gamma_r(x)})}{\gamma_r'(x) \sqrt{\cos(x)}}$$

Near

$$f(x) \sim \frac{\operatorname{and}_r(\sqrt{\gamma_r(x)})}{\gamma_r'(x) \sqrt{\cos(x)}}$$

Allow for a function to be positive in

$(0, \frac{\pi}{2})$ . Only if you do not include

$$\text{so } o^+ \left( \left( \frac{\pi}{2} \right)^- \right)$$

$$\lim_{x \rightarrow 0^+}$$

$$f(x) \sim \frac{\operatorname{and}_r(x^{\frac{1}{2}})}{(2x)^{\alpha}} \approx \frac{x^{\frac{1}{2}}}{2^\alpha \cdot x^\alpha} =$$

$$= \frac{1}{2^\alpha} \cdot \frac{1}{x^{1-\frac{1}{2}}} =$$

Quirni plan con convergencia  $\Theta(1 - \frac{1}{n})$

OSS12  $\alpha < \frac{3}{2}$

Plan  $x \rightarrow \left(\frac{\pi}{2}\right)^-, t = \frac{\pi}{2} - x \rightarrow 0^+$

$$\alpha < \frac{\pi}{2} - t$$

$$f(x) \sim \frac{\text{orden}(\sqrt{x})}{\text{orden}((\pi - x)^+) \sqrt{\gamma_{\text{min}}(x)}} \sim \frac{\frac{\pi}{x}}{\text{orden}(\pi x) \cdot t^{-\frac{1}{2}}} \sim$$

$$\sim \frac{\frac{\pi}{x}}{(2t)^{\alpha} \cdot t^{\frac{1}{2}}} = \frac{\pi}{4 \cdot 2^{\alpha}} \cdot \frac{1}{t^{\alpha + \frac{1}{2}}}$$

Quirni plan la convergencia

$\alpha + \frac{1}{2} < 1$ , OSS12  $\alpha < \frac{1}{2}$

Quirni l'intersección con recta sea 0

Solutan  $\Sigma F$   $\alpha < \frac{1}{2}$

MFX

$$\int_1^x \frac{1}{(x-1)^\alpha} \cdot \log\left(\frac{x}{x-1}\right) dx$$

$$C \sim \alpha = \frac{1}{2}$$

Sigma

$$f(x) = \frac{1}{(x-1)^\alpha} \cdot \log\left(\frac{x}{x-1}\right)$$

Allora la formazione di costanza è

$(1, +\infty)$  è la curva della indeterminazione

sono  $1^+$  e  $+\infty$

Più  $x \rightarrow 1^+$ ,  $t = 1-x \rightarrow 0^+$

$$f(x) \sim \frac{1}{t^\alpha} \cdot \log\left(\frac{1+t}{t}\right) =$$

$$= \frac{1}{t^\alpha} \cdot \log(1+t) - \log(t) \sim$$

$$\sim \frac{1}{t^\alpha} \cdot (\log(t))' = \frac{1}{t^\alpha \cdot \log'(t)}$$

Plan La Convexity  $\alpha < 1$

Plan  $x \rightarrow +\infty$

$$f(x) \sim \frac{1}{x^\alpha} \cdot \ln^{-1}\left(\frac{x-1}{x}\right) \sim$$

$$\sim \frac{1}{x^\alpha} \cdot \left(-\ln\left(1 - \frac{1}{x}\right)\right) \sim$$

$$\sim \frac{1}{x^\alpha} \cdot \left(-\frac{1}{x}\right) = -\frac{1}{x^{\alpha+1}}$$

Plan La Convexity  $\alpha + 1 < 1$  osztás

$\alpha < 0$

Quinn  $L' / L = G_{\alpha+1}$  Convex sol.

$L$  soltánynak  $S^+$  okozza

0 nincs  $S^+$   $\alpha = \frac{1}{2}$   $S^+$  hiány

$$\int_{-\infty}^{+\infty} \frac{1}{x} \cdot \ln(x) dx$$

$$\int_1^x (x-1)^{1/2} dx$$

$$\text{Se } s = \sqrt{x-1}, \quad ds = \frac{dx}{2\sqrt{x-1}} \Rightarrow \sqrt{x-1} ds = dx$$

Si  $A$  e  $C$  i:

$$\int_1^{+\infty} \frac{1}{(x-1)^{1/2}} \cdot \log\left(\frac{x}{x-1}\right) dx =$$

$$= \int_0^{+\infty} \frac{1}{s} \cdot \log\left(\frac{s^2+1}{s^2}\right) (2\sqrt{s}) ds =$$

$$= 2 \int_0^{+\infty} \log\left(\frac{s^2+1}{s^2}\right) ds =$$

$$= \int_0^{+\infty} 1 \cdot \log\left(1 + \frac{1}{s^2}\right) ds =$$

INTC analisi per part

$$= 2 \int_0^{+\infty} \log\left(1 + \frac{1}{s^2}\right) ds - 2 \int_0^{+\infty} s \cdot \frac{(-2s^{-3})}{s^2} ds =$$

$$\int_0^{\infty} \int_0^{\infty} \frac{1}{1+s^2} ds dt = 1 + \frac{1}{s^2}$$

$$= 2 \left( \lim_{s \rightarrow +\infty} \operatorname{Im} \left( 1 + \frac{1}{s^2} \right) - 0 \right) + 4 \int_0^{+\infty} \frac{s^x}{s^2 + 1} ds$$

$$= 0 + 4 \int_0^{+\infty} \frac{1}{s^2 + 1} ds = 4 \left[ \arctan(s) \right]_0^{+\infty} =$$

$$= 4 \left( \lim_{s \rightarrow +\infty} \arctan(s) - 0 \right) - 4 \left( \frac{\pi}{2} \right) = 2\pi$$


---

$$\int_0^4 \frac{(s+3\sqrt{x}) \operatorname{vndt}(x)}{(4x-x^2)^{3/2}} dx$$

s 1 n

$$f(x) = \frac{(s+3\sqrt{x}) \operatorname{vndt}(x)}{(4x-x^2)^{3/2}}$$

L a purutori i losivna p(n) (0, 1),

0.1731 / PNTA + TANF 5.000 0<sup>t</sup> L f

Pi-L X → 0<sup>t</sup>

$$f(x) \sim \frac{s \cdot x^{2\alpha-1}}{(fx)^{\alpha}} = \frac{s}{4^{\alpha}} \cdot \frac{1}{x^{\alpha-2\alpha+1}} = \frac{c}{x^{-\alpha+1}}$$

Per la convergenza -alpha < 1 risulta

alpha > 0

Per x → 4<sup>-</sup>, t = 4 - x → 0<sup>t</sup>,

$$f(x) \sim \frac{(s + \sqrt{4-x})}{(4((4-x) - (4-x)^2))^{\alpha}} \sim$$

$$\sim \frac{s \cdot (4-x)^{2\alpha-1}}{4^{\alpha} \cdot ((4-x)^{\alpha} - (4-x)^{\alpha})} = \frac{s \cdot (4-x)^{2\alpha-1}}{(4-x)^{\alpha} \cdot (4^{\alpha} - (4-x)^{\alpha})} =$$

$$= \frac{s \cdot (4-x)^{\alpha-1}}{4^{\alpha} - (4-x)^{\alpha}} = \frac{s}{4^{\alpha} \cdot (4-x)^{-\alpha+1}} = \frac{s}{(4-x)^{\alpha-\alpha+1}} =$$

$$= \frac{s}{(q-t) \left( q^{\alpha} (q-t)^{-\alpha} - 1 \right)} \sim \frac{c}{t^{\alpha}} \quad \text{C A VOLATIL}$$

PLR L2 Consistency  $\alpha < 1$

(Q+P) L' INFLATION IMPROVING OPTIMALITY

SOLUZIONI SF OCCURR

$$SF \text{ OR } = \frac{1}{2} \text{ ALLURE}$$

$$\int_0^q \frac{(s + \sqrt{x}) \text{ Const}(x)}{(1-x-x^2)^{\frac{1}{2}}} dx =$$

$$= \int_0^q \frac{s + \sqrt{x}}{\sqrt{4x-x^2}} dx$$

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

$$= \int_0^2 \frac{s+t}{\sqrt{4t^2-t^4}} \cdot t dt = 2 \int_0^2 \frac{t(s+3t)}{4t\sqrt{4-t^2}} dt$$

$$= 2 \int_0^{\frac{\pi}{2}} \frac{s + 3t}{\sqrt{4-t^2}} \cdot dt$$

$t = 2 \sin(s)$ ,  $dt = 2 \cos(s) ds$

$$= 2 \int_0^{\frac{\pi}{2}} \frac{s + 6 \sin(s)}{\sqrt{4 - \sin^2(s)}} 2 \cos(s) ds =$$

$$= \int_0^{\frac{\pi}{2}} \frac{s + 6 \sin(s)}{\sqrt{1 - \sin^2(s)}} - \cos(s) ds =$$

$$= 2 \int_0^{\frac{\pi}{2}} \frac{s + 6 \sin(s)}{\sqrt{\cos^2(s)}} - \cos(s) ds =$$

$$= 2 \int_0^{\frac{\pi}{2}} \frac{s + 6 \sin(s)}{-\cos(s)} - \cos(s) ds =$$

$$= 2 \int_0^{\frac{\pi}{2}} s + 6 \sin(s) \cdot \frac{1}{-\cos(s)} ds =$$

$$\begin{aligned}
 &= -12 \int_0^{\frac{\pi}{2}} \sin(\pi \cos s) + 10 \int_0^{\frac{\pi}{2}} ds = \\
 &= -12 \left[ -\cos(s) \right]_0^{\frac{\pi}{2}} + 10 \left[ s \right]_0^{\frac{\pi}{2}} = \\
 &= -12 \left( 0 - 1 \right) + 10 \left[ \frac{\pi}{2} - 0 \right] = \\
 &= 12 + 5\pi
 \end{aligned}$$

$$f(x) = \frac{\arctan(\sqrt{6}x)}{x\sqrt{x}}$$

$$d) \int_0^\infty \frac{\arctan(\sqrt{6}x) \cdot x^{\alpha}}{x\sqrt{x} (\log(3+x^2))}$$

РДЛ: 1) на  $(0, +\infty)$  | РУР: 2) на  $(-\infty, 0)$

$\lim_{x \rightarrow 0^+} f(x) = 0$

$$\lim_{x \rightarrow 0^+} f(x) = 0$$

$$\text{and } \frac{(\sqrt{6}x) \cdot x^\alpha}{x\sqrt{x} (\log(3+x^\alpha))} \sim \frac{\sqrt{6}x \cdot x^\alpha}{x\sqrt{x} \log^2(3)} =$$

$$= \frac{\sqrt{6} \cdot x^{\frac{1}{2}} \cdot x^\alpha}{x \cdot x^{\frac{1}{2}} \cdot \log^2(x)} \sim \frac{\sqrt{6}}{x^{1-\alpha}}$$

PER LA CONVERGENZA  $1 - \alpha < 1 \iff \alpha > 0$

PER  $x \rightarrow +\infty$

$$\text{and } \frac{(\sqrt{6}x) \cdot x^\alpha}{x\sqrt{x} (\log(3+x^\alpha))} \sim \frac{\frac{\pi}{2} \cdot x^\alpha}{x\sqrt{x} \cdot \log^2(x)} =$$

$$= \frac{C}{x^{\frac{1}{2}-\alpha} \cdot \log^2(x)} = \frac{C}{x^{\frac{3}{2}-\alpha} \cdot \log^2(x)}$$

PER LA CONVERGENZA  $\frac{3}{2} - \alpha > 1 \iff \alpha < \frac{1}{2}$

ORIEN

DIVIDENDO L'INTESA UNA VOLTA IMPROBABILMENTE CONVERGENTI

5. L 0 C : 5. L T M A T O C O C E  $\frac{t}{7}$

b)  $\int_{\frac{1}{6}}^{+\infty} \frac{\arctan(\sqrt{6x})}{x \sqrt{x}} dx$

Sub  
 $t = \sqrt{6x}$ ,  $x = \frac{t^2}{6}$ ,  $dx = \frac{t}{3} dt$

$$\int_{\frac{1}{6}}^{+\infty} \frac{\arctan(\sqrt{6x})}{x \sqrt{x}} dx = \int_1^{+\infty} \frac{\arctan(t)}{\frac{t^2}{6} \sqrt{\frac{t^2}{6}}} \frac{t}{3} dt =$$

$$= 2\sqrt{6} \int_1^{+\infty} \frac{\arctan(t)}{t^2} dt =$$

$$= 2\sqrt{6} \int_1^{+\infty} \arctan(t) \cdot \left(-\frac{1}{t^2}\right) dt =$$

$$= -\sqrt{6} \left[ \arctan(t) \right]_{-\infty}^{+\infty} + \left( \frac{1}{t(1+t^2)} \right)_0^{+\infty} =$$

$$\frac{1}{t(t+1)} = \frac{A}{t} + \frac{\beta t + c}{t^2 + 1} = \frac{A(t^2 + 1) + \beta t^2 + ct}{t(t^2 + 1)}$$

$$A(t^2 + 1) + \beta t^2 + ct = 1$$

$$(A + \beta)t^2 + ct + A = 1$$

$$\begin{cases} A = 1 \\ C = 0 \\ A + \beta = 0 \end{cases} \rightarrow \begin{cases} A = 1 \\ C = 0 \\ \beta = -1 \end{cases}$$

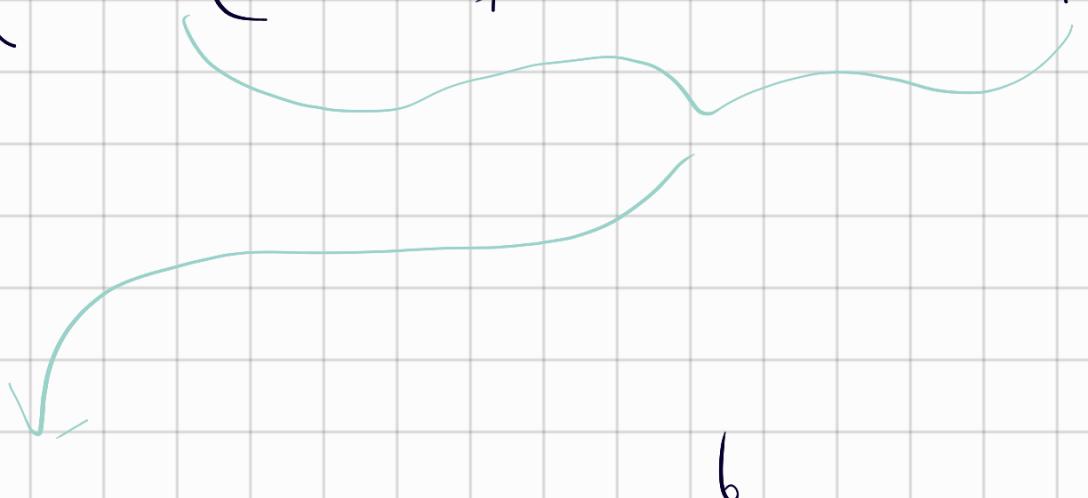
$$\int_1^{+\infty} \frac{1}{t(t+1)} dt = \int_1^{+\infty} \frac{1}{t} dt - \int_1^{+\infty} \frac{1+t}{t^2+1} dt$$

ACCURATE

$$\sim \sqrt{6} \left( \int_{-\frac{\pi}{4} - \frac{1}{t}}^0 o(t) dt \right)^{+\infty} + \int_1^{+\infty} \frac{1}{t(1+t)} o(t) dt$$

$$= 2\sqrt{6} \left( -o\left(-\frac{\pi}{4}\right) \right) + \int_1^{+\infty} \left( \frac{1}{t} - \frac{t}{t^2+1} \right) o(t) dt$$

$$\rightarrow 2\sqrt{6} \left( \frac{\pi}{4} + \left[ \ln(rt) \right]_1^{+\infty} - \frac{1}{2} \left[ \ln(t^2+1) \right]_1^{+\infty} \right) =$$



$$\lim_{b \rightarrow 1^+} \left[ \ln(b) - \frac{1}{2} \ln(b^2+1) \right]_1^b =$$

$$\lim_{b \rightarrow 1^+} \left( \ln(b) - \frac{1}{2} \ln(b^2+1) \right) - \left( \ln(1) - \frac{1}{2} \ln(2) \right) =$$

$$\lim_{b \rightarrow 1^+} \left( \ln(b) - \frac{1}{2} \ln(b^2+1) \right) + \frac{\ln(2)}{2}$$

$$= \lim_{b \rightarrow +\infty} \left( \ln \left( \frac{b}{\sqrt{b^2+1}} \right) \right) + \frac{\ln(\omega)}{2} =$$

$$= 0 + \underbrace{\ln(\omega)}_{\sim}$$

(2. u. r. D)

$$\pi \sqrt{6} \left( \frac{\pi}{4} + \left[ \ln(t_1) \right]_{1}^{+\infty} - \frac{1}{2} \left[ \ln(t_1) \right]_{1} \right) =$$

$$= \pi \sqrt{6} \left( \frac{\pi}{4} + \frac{\ln(\omega)}{\pi} \right) = \sqrt{6} \left( \frac{\pi}{4} + \ln(\omega) \right)$$

$$\int_0^{\frac{\pi}{4}} \frac{(1-x) (F_n(x))^{\alpha}}{x^{\frac{\alpha}{n}} (1-F_n(x))^{\alpha-1}} o(x)$$

Mittelwert Intervall  $(0, \frac{\pi}{4})$  bei  $\omega = 1$

$\Omega$  Integrations:  $0^+ \in \left( \frac{\pi}{4} \right)^-$

Prin  $x \rightarrow 0^+$

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

Prin La convergence forte  $\frac{3}{2} - \alpha < 1$  osrln

$$\alpha > \frac{1}{2}$$

Prin  $x \rightarrow \left(\frac{\pi}{4}\right)^-$ ,  $t = \frac{\pi}{4} - x \rightarrow 0$

