I LIMITI NOTEVOLI

$$\lim_{x\to 0}\frac{senx}{x}=1 \quad ; \quad \lim_{x\to 0}\frac{1-cosx}{x}=0 \quad ; \quad \lim_{x\to 0}\frac{1-cosx}{x^2}=\frac{1}{2}$$

Esercizio n. 236 a pag. 172 U

$$\lim_{x\to 0}\frac{x^2+x}{2x+senx}=\frac{0}{0} \quad \textbf{F. I.}$$

$$\frac{x^2+x}{2x+senx} = \frac{x(x+1)}{2x+senx} = \frac{\frac{x(x+1)}{x}}{\frac{2x+senx}{x}} = \frac{x+1}{2+\frac{senx}{x}} \rightarrow$$

$$\lim_{x\to 0}\frac{x^2+x}{2x+senx} = \lim_{x\to 0}\frac{x+1}{2+\frac{senx}{x}} = \frac{1}{2+1} = \frac{1}{3}$$

Esercizio n. 244 a pag. 173 U

$$\lim_{x\to 0}\frac{1-cosx-senx}{x}=\frac{1-1-0}{0}=\frac{0}{0} \quad \textbf{F. I.}$$

$$\lim_{x\to 0}\left(\frac{1-cosx}{x}-\frac{senx}{x}\right)=0-1=-1$$

Esercizio n. 248 a pag. 173 U

$$\lim_{x\to 0}\frac{sen2x+x}{x+senx}=\frac{0+0}{0+0}=\frac{0}{0} \quad \textbf{F.I.}$$

$$\frac{sen2x+x}{x+senx}=\frac{\frac{sen2x+x}{x}}{\frac{x+senx}{x}}=\frac{\frac{sen2x}{x}+1}{1+\frac{senx}{x}}=\frac{\frac{2sen2x}{2x}+1}{1+\frac{senx}{x}} \rightarrow$$

$$\lim_{x\to 0}\frac{sen2x+x}{x+senx}=\lim_{x\to 0}\frac{\frac{2sen2x}{2x}+1}{1+\frac{senx}{x}}=\frac{2\cdot 1+1}{1+1}=\frac{3}{2}$$

I LIMITI NOTEVOLI

$$\lim_{x\to \infty}\left(1+\frac{1}{x}\right)^x=e \quad ; \quad \lim_{x\to 0}\frac{\ln(1+x)}{x}=1 \quad ; \quad \lim_{x\to 0}\frac{e^x-1}{x}=1$$

Esercizio n. 257 a pag. 174 U

$\lim_{x \to -\infty} (\frac{x-7}{x})^x = 1^\infty$ **F.I.**

$(\frac{x-7}{x})^x = (1 - \frac{7}{x})^x$, ponendo $y = -\frac{x}{7}$, $y \to +\infty$ per $x \to -\infty$ e si ha:

$\lim_{x \to -\infty} (\frac{x-7}{x})^x = \lim_{y \to +\infty} (1 + \frac{1}{y})^{-7y} = \lim_{y \to +\infty} ((1 + \frac{1}{y})^y)^{-7} = e^{-7}$

Esercizio n. 259 a pag. 174 U

$\lim_{x \to +\infty} \{x[\ln(x+1) - lnx]\} = +\infty[\infty - \infty]$ **F. I.**

$\lim_{x \to +\infty} \{x[\ln(x+1) - lnx]\}$ **=** $\lim_{x \to +\infty} \{x[\ln(\frac{x+1}{x})]\}$ **=** $\lim_{x \to +\infty} \ln(1 + \frac{1}{x})^x$ **=** $\ln(e)$ **=** 1

Esercizio n. 269 a pag. 174 U

$\lim_{x \to +\infty} (1 - \frac{2}{x})^x = 1^\infty$ **F. I.**

ponendo $t = -\frac{x}{2}$ **, per** $x \to +\infty$ **,** $t \to -\infty$ **e**

$\lim_{x \to +\infty} (1 - \frac{2}{x})^x$ **=** $\lim_{t \to -\infty} (1 + \frac{1}{t})^{-2t}$ **=** $\lim_{t \to -\infty} (1 + \frac{1}{t})^{-2t}$ **=** $\lim_{t \to -\infty} ((1 + \frac{1}{t})^t)^{-2}$ **=** e^{-2}

Esercizio n. 273 a pag. 175 U

$\lim_{x \to 0} \frac{\ln(1-4x)}{x} = \frac{0}{0}$ **F. I.**

ponendo $t = -4x$ **,** $t \to 0$ **per** $x \to 0$ **e il limite diventa:**

$\lim_{x \to 0} \frac{\ln(1-4x)}{x}$ **=** $\lim_{t \to 0} \frac{\ln(1+t)}{-\frac{t}{4}}$ **=** $\lim_{t \to 0} -4\frac{\ln(1+t)}{t}$ **=** $-4 \cdot 1$ **=** -4

Esercizio n. 276 a pag. 175 U

$\lim_{x \to 0} \frac{e^{-2x} - 1}{x} = \frac{0}{0}$ **F. I.**

ponendo $t = -2x$ **,** $t \to 0$ **per** $x \to 0$ **e il limite diventa:**

$\lim_{x \to 0} \frac{e^{-2x} - 1}{x}$ **=** $\lim_{t \to 0} \frac{e^t - 1}{-\frac{t}{2}}$ **=** $\lim_{t \to 0} -2\frac{e^t - 1}{t}$ **=** $-2 \cdot 1$ **=** -2