Pg. 1790 es. 178 - 179 - 183 - 186 - 193 - 194 - 196 - 198

178) $$\sum_{n=1}^{+\infty} \frac{1}{\sqrt[4]{n^4+1}} = 0,8 + 0,4 + 0,3 + \ldots$$

$$\lim_{n \to +\infty} \frac{1}{\sqrt[4]{n^4+1}} = 0$$ potrebbe convergere

$$\sum_{n=1}^{+\infty} \frac{1}{n}$$ serie armonica divergente

$$\sum_{n=1}^{+\infty} \frac{1}{\sqrt[4]{n^4+1}} < \sum_{n=1}^{+\infty} \frac{1}{n}$$

$$\sqrt[4]{n^4+1} > n \qquad \cancel{\sum_{n=1}^{+\infty} \frac{1}{n}} \text{ ~~è maggiorante~~}$$

$\cancel{\sum_{n=1}^{+\infty} \frac{1}{n}}$ ~~è maggiorante minorante divergente~~ $\sum_{n=1}^{+\infty} n$ è minorante divergente

quindi $$\sum_{n=1}^{+\infty} \frac{1}{\sqrt[4]{n^4+1}}$$ è divergente

179) $$\sum_{n=1}^{+\infty} \frac{2^n}{n}$$

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$$\lim_{n \to +\infty} \frac{2^n}{n} = 2^n \log 2 = +\infty$$ è divergente

183) $$\sum_{n=1}^{+\infty} \frac{1}{4^n(n+2)}$$

$$\lim_{n\to+\infty} \left(\frac{1}{\underset{\downarrow\,+\infty}{4^n}\,\underset{\downarrow\,+\infty}{(n+2)}}\right) = 0$$ potrebbe convergere

$$\sum_{n=1}^{+\infty} \frac{1}{4^n}$$ serie geometrica convergente

$$\sum_{n=1}^{+\infty} \frac{1}{4^n(n+2)} < \sum_{n=1}^{+\infty} \frac{1}{4^n} \to$$ maggiorante convergente

$$4^n(n+2) > 4^n$$

$$\sum_{n=1}^{+\infty} \frac{1}{4^n(n+2)}$$ è convergente

186) $$\sum_{n=1}^{+\infty} \frac{3^n}{8^n+2}$$

$$\lim_{n\to+\infty} \frac{3^n}{8^n+2} = \lim_{n\to+\infty} \frac{8^n\left(\frac{3^n}{8^n}\right)}{8^n\left(1+\frac{2}{8^n}\right)} =$$

$$\lim_{n\to+\infty} \frac{\left(\frac{3}{8}\right)^n}{\left(1+\frac{2}{8^n}\right)} = \frac{0}{1+0} = 0$$ potrebbe convergere

$$\sum_{n=1}^{+\infty} \left(\frac{3}{8}\right)^n \to$$ convergente - serie geometrica

$$\sum_{n=1}^{+\infty} \frac{3^n}{8^n+2} < \sum_{n=1}^{+\infty} \left(\frac{3}{8}\right)^n \to$$ maggiorante convergente

$\hookrightarrow$ è convergente

193) $\displaystyle\sum_{n=2}^{+\infty} \frac{4n-5}{9n^2+n}$

$\displaystyle\sum_{n=2}^{+\infty} \frac{1}{n}$ divergente

$$\lim_{n\to+\infty} \frac{\frac{4n-5}{9n^2+n}}{\frac{1}{n}} = \lim_{n\to+\infty} \frac{4n^2-5n}{9n^2+n}$$

$$= \cancel{\lim_{n\to+\infty} \frac{n(4n-5)}{n(9n+5)}} = \lim_{n\to+\infty} \frac{\cancel{n^2}\left(4-\frac{5}{n}\right)}{\cancel{n^2}\left(9+\frac{1}{n}\right)} = \frac{4}{9} \neq 0$$ stesso carattere

$\displaystyle\sum_{n=2}^{+\infty} \frac{4n-5}{9n^2+n} \Rightarrow$ divergente

194) $\displaystyle\sum_{n=1}^{+\infty} \frac{2^n-1}{3^n+2}$

$\displaystyle\sum_{n=1}^{+\infty} \left(\frac{2}{3}\right)^n$ convergente

$$\lim_{n\to+\infty} \frac{\frac{2^n-1}{3^n+2}}{\frac{2^n}{3^n}} = \lim_{n\to+\infty} \frac{2^n-1}{3^n+2} \cdot \frac{3^n}{2^n}$$

$$= \lim_{n\to+\infty} \frac{\cancel{2^n}\left(1-\frac{1}{2^n}\right)}{\cancel{3^n}\left(1+\frac{2}{3^n}\right)} \cdot \frac{\cancel{3^n}}{\cancel{2^n}} = 1 \neq 0$$ stesso carattere

$\displaystyle\sum_{n=1}^{+\infty} \frac{2^n-1}{3^n+2} \Rightarrow$ convergente

196) $\displaystyle\sum_{n=1}^{+\infty} \frac{n^3}{6+n^4}$

$\displaystyle\sum_{n=1}^{+\infty} \frac{1}{n}$ divergente

$$\lim_{n\to+\infty} \frac{\frac{n^3}{6+n^4}}{\frac{1}{n}} = \lim_{n\to+\infty} \frac{\cancel{n^4}\,1}{\cancel{n^4}\left(1+\frac{6}{n^4}\right)} = 1 \neq 0 \quad \text{stesso carattere}$$

$\displaystyle\sum_{n=1}^{+\infty} \frac{n^3}{6+n^4} \Rightarrow$ divergente

198) $\displaystyle\sum_{n=3}^{+\infty} \frac{n+2}{n-2}\cdot 7^{-n}$

$\displaystyle\sum_{n=3}^{+\infty} \left(\frac{1}{7}\right)^{+n}$ Convergente

$$\lim_{n\to+\infty} \frac{\frac{n+2}{n-2}\cdot \cancel{7^{-n}}}{\cancel{7^{-n}}} = 1 \neq 0 \quad \text{stesso carattere}$$

$\displaystyle\sum_{n=3}^{+\infty} \frac{n+2}{n-2}\cdot 7^{-n}$ convergente