MATIAS MONDACA MONDACA

1) $x^5-6x^3-8x^2-3x$

A) $P(-1)=(-1)^5-6(-1)^3-8(-1)^2-3(-1)=0$

$P'(-1)=5x^4-18x^2-16x-3 \Rightarrow 5(-1)^4-18(-1)^2-16(-1)-3=0$

$P''(-1)=20x^3-36x-16 \Rightarrow 20(-1)^3-36(-1)-16=0$

$P'''(-1)=60x^2-36 \Rightarrow 60(-1)^2-36=24 \neq 0$

$x=-1$ es una Raiz con multiplicidad 3

II) $\sum_{N=1}^{\infty} \frac{2N^2}{(3N-2)(3N+1)} \Rightarrow \frac{2N^2}{9N^2+3N-6N-2} \Rightarrow \frac{2N^2}{9N^2-3N-2} \Rightarrow$

$\lim_{N=\infty} \frac{2N^2}{9N^2-3N-2} = \frac{2\cancel{N^2}}{9\cancel{N^2}} = \frac{2}{9} \Rightarrow \lim_{N\to\infty} 2/9 \neq 0$ Diverge a $2/9$

B) $\sum_{N=1}^{\infty} \frac{(N+4)!}{2^N N^2 (N+1)!} = \sum_{N=1} a_N \quad \lim_{N=\infty} \frac{a_{N+1}}{a_N} = L$

$$\frac{\frac{((N+1)+4)!}{2^{(N+1)}(N+1)^2((N+1)+1)!}}{\frac{(N+4)!}{2^N N^2 (N+1)}} = \left|\frac{a_{N+1}}{a_N}\right| \Rightarrow \frac{\frac{(N+5)!}{2^{N+1}(N+1)^2(N+2)!}}{\frac{(N+4)!}{2^N N^2 (N+1)}}$$

$$\Rightarrow \frac{(N+5)! \cdot 2^N N^2 (N+1)!}{2^{N+1}(N+1)^2(N+2)!(N+4)!} = \frac{N^2(N+5)}{2(N+2)(N+1)^2} \Rightarrow \lim_{N=\infty} \frac{N^2(N+5)}{2(N+2)(N+1)^2}$$

$$\frac{1}{2} \cdot \lim_{N\to\infty} \frac{N^2(N+5)}{(N+2)(N+1)^2} = \frac{1}{2} \lim_{N=\infty} \frac{3N^2+10N}{3N^2+8N+5} = \frac{6N+10}{6N+8} = \frac{3N+5}{3N+4}$$

$$\frac{1}{2} \cdot \lim_{N\to\infty} \frac{3N+5}{3N+4} \Rightarrow \frac{1}{2} \cdot \lim_{N\to\infty} \left(\frac{3}{3}\right) = 1 \Rightarrow \frac{1}{2} \cdot 1 = \frac{1}{2} < 1$$

$\frac{1}{2} < 1$ = Es Convergente

III) $\sum_{N=1}^{\infty} \frac{(-1)^N (x-5)^N}{2^N (3N+2)} \Rightarrow \frac{a_{N+1}}{a_N} \Rightarrow \frac{\frac{(-1)^{(N+1)}(x-5)^{(N+1)}}{2^{(N+1)}(3(N+1)+2}}{\frac{(-1)^N (x-5)^N}{2^N(3N+2)}}$

$\Rightarrow \frac{(-1)^{N+1}(x-5)^{N+1} \cdot 2^N (3N+2)}{2^{N+1}(3(N+1)+2)(-1)^N (x-5)^N} = \frac{(x-5)(3N+2)}{2(3(N+1)+2)}$

$\Rightarrow -\frac{(x-5)(3N+2)}{2(3N+5)} \Rightarrow \lim_{N=\infty} -\frac{(x-5)(3N+2)}{2(3N+5)} \Rightarrow \left|-\frac{x-5}{2}\right| \cdot \lim_{N=\infty} \frac{3N+2}{3N+5}$

$= \left|\frac{-x-5}{2}\right| \cdot 1 \Rightarrow \left|\frac{x-5}{2}\right| < 1 \Rightarrow -1 \left|\frac{x-5}{2}\right| < 1$

1) $\frac{x-5}{2} > 1 \Rightarrow \frac{2(x-5)}{2} > 2(-1) \Rightarrow x-5 > -2 \Rightarrow x = -2+5 \Rightarrow \boxed{x=3}$

2) $\frac{x-5}{2} < 1 \Rightarrow \frac{2(x-5)}{2} < 2(1) \Rightarrow x-5 < 2 \Rightarrow x = 2+5 \Rightarrow \boxed{x=7}$

$\boxed{3 < x \leq 7}$

Para $x=3$ $\sum_{N=1}^{\infty} \frac{(-1)^N (3-5)^N}{2^N (3N+2)} =$