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PRUEBA de ENSAYO AII 18-03-20

## PROBLEMA 1.

$P(x)=x^5-6x^3-8x^2-3x$

$x=-1 \rightarrow (x+1)$

a) $P(x)=x^5-6x^3-8x^2-3x$

$P(-1)=-1+6-8+3$

$P(-1)=0$

① 

$P'(x)=5x^4-18x^2-16x-3$

$P'(-1)=5-18+16-3$

$P'(1)=0$

② 

$P''(x)=20x^3-36x-16$

$P''(-1)=-20+36-16$

$P''(-1)=0$

③ 

$P'''(x)=60x^2-36$

$P'''(-1)=60-36$

$P'''(-1)=24$

④ ×

MULTIPLICIDAD 3.

$$\boxed{(x+1)^3}$$

$(x+1)^3=x^3+3x^2\cdot 1+3\cdot x\cdot 1^2+1^3$

$(x+1)^3=x^3+3x^2+3x+1$

$x^5-6x^3-8x^2-3x : x^3+3x^2+3x+1$

$-x^5-3x^4-3x^3-x^2 \quad | \ (x^2-3x)$

$-3x^4-9x^3-9x^2-3x$

$3x^4+9x^3+9x^2+3x$

$0$

$(x^2-3x)=x(x-3)$

b) $\dfrac{x^5-6x^3-8x^2-3x}{(x+1)^3}=x(x-3)$

Los dos RAÍCES FALTANTES son $x=0$ y $x=3$.

c) $\dfrac{x(x-3)\cancel{(x+1)^3}}{\cancel{(x+1)^3}}=x(x-3)$

## PROBLEMA 2.

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

$$a_n = \frac{2n^2}{(3n-2)(3n+1)} = \frac{2n^2}{9n^2-3n-2}$$

$$\lim_{n\to\infty} \frac{2n^2}{9n^2-3n-2} = \frac{2}{9} \neq 0$$

LA serie (a) diverge.

b) $\displaystyle\sum_{n=1}^{\infty} \frac{(n+4)!}{2^n \cdot n^2 (n+1)!}$

$$\lim_{n\to\infty} \frac{(n+4)!}{2^n \cdot n^2 (n+1)!} = \frac{\overset{n+5}{\cancel{(n+5)!}}}{2^{n+1} \cdot (n+1)^2 \underset{n+2}{\cancel{(n+2)!}}} \cdot \frac{\cancel{2^n} \cdot \cancel{n^2} \cancel{(n+1)!}}{\cancel{(n+4)!}}$$

$$= \frac{(n+5)\,n^2}{2 \cdot (n+1)^2 (n+2)} = \frac{1}{2} < 1$$

La serie (b) converge.

## PROBLEMA 3.

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

$(x-a) = (x-5)^n$

$$\lim_{n\to\infty} \left| \frac{(-1)^{n+1}}{2^{n+1}(3n+5)} \cdot \frac{\cancel{2^n}(3n+2)}{\cancel{(-1)^n}} \right| = \left| \frac{-1\,(3n+2)}{2\,(3n+5)} \right| = \boxed{\frac{1}{2} = L}$$

a) $R = \dfrac{1}{\left(\frac{1}{2}\right)} \rightarrow \boxed{R = 2}$

$(a-R), (a+R)$

$(5-2), (5+2)$

$(3, 7) \longrightarrow$ convergencia ABSOLUTA.

Continuación Problema 3.

$\boxed{x=3}$

$$\sum \frac{(-1)^n(3-5)^n}{2^n(3n+2)} = \frac{(-1)^n(-2)^n}{2^n(3n+2)} = \frac{\cancel{2^n}}{\cancel{2^n}(3n+2)} = \frac{1}{(3n+2)}$$

$\downarrow$ por comparación $\sum \frac{1}{n}$.

$\boxed{x=7}$

$$\sum \frac{(-1)^n(7-5)^n}{2^n(3n+2)} = \frac{(-1)^n\cancel{(2)^n}}{\cancel{2^n}(3n+2)} = \frac{(-1)^n}{(3n+2)}$$

$\rightarrow$ converge por comparación $\sum \frac{(-1)^n}{n}$.

$[3, 7] \rightarrow$ la serie converge en este intervalo y diverge fuera de este.

$$\lim_{n\to\infty} \frac{1}{n} = 0 \quad \text{Convergente}$$

$$\lim_{n\to\infty} \frac{(-1)^n}{n} = 0 \quad \text{Convergente}$$