Sebastián González Herrera 20.415.868-1 Algebra II

Problema 1

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

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

$5(-1)^4 - 18(-1)^2 - 16(-1) - 3 \rightarrow$

$5 - 18 + 16 - 3$

0

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

$20(-1)^3 - 36(-1) - 16$

$-20 + 36 - 16$

0

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

$60(-1)^2 - 36$

$60 - 36$

24

Multiplicidad 3

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

$$\frac{x^5 - 6x^3 - 8x^2 - 3x}{(x+1)^3} = \frac{x(x^4 - 6x^2 - 8x - 3)}{(x+1)^3}$$

Problema 2

$$\sum_{n=1}^{\infty} \frac{2n^2}{(3n-2)(3n+1)} \rightarrow a_n = \frac{2n^2}{9n^2-3n-2} \rightarrow \lim_{n\to\infty} \frac{2n^2}{9n^2-3n-2}$$

$$\rightarrow \lim_{n\to\infty} = \frac{2\cancel{n^2}}{9\cancel{n^2}} \rightarrow \lim_{n\to\infty} = \frac{2}{9} \neq 0 \quad \text{Diverge.}$$

$$\sum_{n=1}^{\infty} \frac{(n+4)!}{2^n n^2 (n+1)!} \rightarrow \frac{(n+4)\cancel{n!}}{2^n n^2 (n+1)n!} \rightarrow a_n = \frac{n+4}{2^n n^2 (n+1)}$$

$$a_{n+1} = \frac{n+5}{2^{n+1}(n+1)^2(n+2)} \qquad \frac{a_{n+1}}{a_n} = \frac{\dfrac{n+5}{2^{n+1}(n+1)^2(n+2)}}{\dfrac{n+4}{2^n n^2 (n+1)}}$$

$$\frac{a_{n+1}}{a_n} = \frac{\cancel{2^n} n^2 \cancel{(n+1)}(n+5)}{\cancel{2^{n+1}} \cancel{(n+1)^2}(n+2)(n+4)} \rightarrow \frac{n^2(n+5)}{2(n+1)(n+2)(n+4)} \rightarrow \frac{n^3+5n^2}{2n^3+14n^2+28n+16}$$

$$\lim_{n\to\infty} = \frac{\cancel{n^3}+\cancel{5n^2}}{2\cancel{n^3}+\cancel{14n^2}+\cancel{28n}+\cancel{16}} \rightarrow \lim_{n\to\infty} = \frac{1}{2} \neq 0 \quad \text{Converge.}$$

Problema 3

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

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

$$\left| \frac{(-1)^{n+1}}{2^{n+1}(3n+5)} \cdot \frac{2^n(3n+2)}{(-1)^n} \right| = \left| \frac{-1(3n+2)}{2(3n+5)} \right| = \left| \frac{1}{2} \right| = L$$

$$R = \frac{1}{\frac{1}{2}} = \frac{2}{1} = 2 \longrightarrow R = [5-2, 5+2]$$

$$[3, 7]$$