Cálculo Infinitesimal
Hoja 3.

1.- Estudiar el carácter de las series de término general:

(a) $\dfrac{\text{sen}^4 n}{n^2}$

(b) $\dfrac{1}{\sqrt{n} - 2/3}$

(c) $\dfrac{1 + n^2}{n!}$

(d) $\cos^n \left(a + \dfrac{b}{n} \right) \ (0 < a < \pi/2)$

(e) $\dfrac{n^2 + 1}{na^n} \ (a \neq 0)$

(f) $\dfrac{n!}{n^n}$

(g) $\dfrac{3^n}{n^2 + 1}$

(h) $\left(\dfrac{n+1}{n} \right)^{-n^3}$

(i) $\dfrac{1}{\log n}$

(j) $\dfrac{1}{\sqrt{n(n+1)}(\sqrt{n} + \sqrt{n+1})}$

(k) $\dfrac{\text{sen}(nx)}{n^2}$

(l) $\dfrac{1}{n - 3/2}$

(m) $\dfrac{1}{na + b}, \ (a, b) \neq (0, 0)$

(n) $\dfrac{1 + \text{sen}^2(nx)}{n^2}$

(ñ) $\dfrac{1}{n} \text{sen} \dfrac{1}{n}$

(o) $\dfrac{1}{n(n+1)(n+2)}$

(p) $\dfrac{n(n+1)}{n^2 + 2n}$

(q) $\left(\dfrac{1}{n} \right)^{n+1/n}$

(r) $\dfrac{\sqrt{n+1} - \sqrt{n}}{n}$

(s) $\dfrac{1}{3 - \cos(1/n)}$

(t) $\left(\dfrac{x}{n} \right)^n n!$

(u) $\dfrac{1 + \frac{1}{2} + \cdots + \frac{1}{n}}{n^3 \log n}$

(v) $\dfrac{1}{(\log n)^{2n}}$

(w) $e^{-\sqrt{n^2+1}}$

(x) $\dfrac{1}{(\log n)^p}$

(y) $\log \left(1 + \dfrac{x}{n} \right)$

(z) $\dfrac{(n^2 + 1)x^n}{(n+1)!}$

(aa) $\dfrac{x^n}{\sqrt{n}}$

(ab) $\dfrac{(-1)^n}{1 + \frac{1}{2} + \cdots + \frac{1}{n}}$

(ac) $\dfrac{1}{n^2(1 + \frac{1}{2} + \cdots + \frac{1}{n})}$

(ad) $\dfrac{(-1)^n(n+1)}{n!}$

(ae) $\log \dfrac{n+1}{n}$

2.- Estudiar el carácter de las series:

a) $\dfrac{1}{2} - \dfrac{2}{5} + \dfrac{3}{10} - \dfrac{4}{17} + \cdots + (-1)^{n+1}\dfrac{n}{n^2+1} + \cdots$

b) $\dfrac{1}{\sqrt{2}-1} - \dfrac{1}{\sqrt{2}+1} + \dfrac{1}{\sqrt{3}-1} - \dfrac{1}{\sqrt{3}+1} + \cdots + \dfrac{1}{\sqrt{n}-1} - \dfrac{1}{\sqrt{n}+1} + \cdots$

c) $\sqrt{a} - a + \sqrt[4]{a} - \sqrt[3]{a} + \cdots + \sqrt[2n]{a} - \sqrt[2n-1]{a} + \ldots$, $a > 0$.

3.- Estudiar el carácter de las series

1. $\displaystyle\sum_{n=1}^{\infty} \sqrt{\dfrac{n^2+1}{n}} - \dfrac{1}{\sqrt{n}}$

2. $\displaystyle\sum_{n=1}^{\infty} n^s(\sqrt{n+1} - 2\sqrt{n} + \sqrt{n-1})$

3. $\displaystyle\sum_{n=1}^{\infty} (-1)^n \dfrac{\log n}{n}$

4. $\displaystyle\sum_{n=1}^{\infty} \dfrac{\log n}{n}$

5. $\displaystyle\sum_{n=0}^{\infty} \dfrac{2n+1}{(n+1)^2(n+2)^2}$

6. $\displaystyle\sum_{n=1}^{\infty} \text{arcsen}\dfrac{1}{\sqrt{n}}$

7. $\displaystyle\sum_{n=1}^{\infty} \dfrac{\text{sen}\,n}{n^3+n}$

8. $\displaystyle\sum_{n=1}^{\infty} \left(1 - \cos\dfrac{1}{n}\right)$

9. $\displaystyle\sum_{n=1}^{\infty} \dfrac{\log n}{n^2}$

10. $\displaystyle\sum_{n=1}^{\infty} (\sqrt{2n-1} - \sqrt{n})$

11. $\displaystyle\sum_{n=1}^{\infty} \left(\dfrac{2n}{4n+3}\right)^n$

12. $\displaystyle\sum_{n=1}^{\infty} \dfrac{n!2^n}{n^n}$

13. $\displaystyle\sum_{n=1}^{\infty} \dfrac{\sqrt{n+1}}{n^2+1}$

14. $\displaystyle\sum_{n=1}^{\infty} \dfrac{\cos(n+1)}{n^3+1}$

15. $\displaystyle\sum_{n=1}^{\infty} \left(\dfrac{2n+1}{2n}\right)^{-n^3}$

16. $\displaystyle\sum_{n=1}^{\infty} \dfrac{\sqrt[6]{n}}{\sqrt[4]{n^3} + 2\sqrt[8]{n}}$

17. $\displaystyle\sum_{n=1}^{\infty} e^{-\frac{n^3+1}{n^2-n}}$

18. $\displaystyle\sum_{n=1}^{\infty} \dfrac{n^2+3}{(n+1)!}$

19. $\displaystyle\sum_{n=1}^{\infty} \text{sen}\dfrac{1}{\sqrt{n}}(\sqrt{n^2+1} - n)$

1. $\displaystyle\sum_{n=1}^{\infty} \left(\frac{1}{3}\right)^{-n}$

2. $\displaystyle\sum_{n=1}^{\infty} \frac{3n^2+5}{5n^2+3n+7}$

3. $\displaystyle\sum_{n=1}^{\infty} \frac{2n+5}{7n-5}$

4. $\displaystyle\sum_{n=1}^{\infty} r^n, \; r \geq 0$

5. $\displaystyle\sum_{n=1}^{\infty} \frac{2^n-5}{3^n+n}$

6. $\displaystyle\sum_{n=1}^{\infty} \frac{1}{n^2}$

7. $\displaystyle\sum_{n=1}^{\infty} \frac{1}{\sqrt{n}}$

8. $\displaystyle\sum_{n=1}^{\infty} \frac{r^n}{n!}$

9. $\displaystyle\sum_{n=1}^{\infty} \frac{2^n n!}{n^n}$

10. $\displaystyle\sum_{n=1}^{\infty} \left(\frac{3n-5}{2n+7}\right)^{5n+8}$

11. $\displaystyle\sum_{n=1}^{\infty} \left(\frac{n+1}{2n-1}\right)^n$

12. $\displaystyle\sum_{n=1}^{\infty} \left(\frac{n}{3n-1}\right)^{2n-1}$

13. $\displaystyle\sum_{n=1}^{\infty} \frac{\log n}{n}$

14. $\displaystyle\sum_{n=1}^{\infty} \frac{1}{\sqrt[3]{n^3+1}}$

15. $\displaystyle\sum_{n=1}^{\infty} \frac{1}{2^n+n^3+n^2+3}$

16. $\displaystyle\sum_{n=1}^{\infty} \frac{1}{10n^2+5n-27}$

17. $\displaystyle\sum_{n=1}^{\infty} \frac{2n^4+7}{3n^5+4n^3-n}$

18. $\displaystyle\sum_{n=1}^{\infty} \operatorname{sen} \frac{1}{n^3}$

19. $\displaystyle\sum_{n=1}^{\infty} \frac{n}{(n^7-n+1)^{1/3}}$

20. $\displaystyle\sum_{n=1}^{\infty} \frac{\operatorname{sen} n}{n^2}$

21. $\displaystyle\sum_{n=1}^{\infty} (-1)^{n+1} \frac{n!}{n^n}$

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

23. $\displaystyle\sum_{n=1}^{\infty} \frac{(-1)^n}{n(\log n)^2}$

24. $\displaystyle\sum_{n=1}^{\infty} \frac{\sqrt{n+1}-\sqrt{n}}{n+\sqrt{n}}$