Bài tập số 2: Chuỗi số.

Bài 1. Trong các chuỗi sau, chuỗi nào phân kỳ theo điều kiện cần của chuỗi hội tụ:

$$1. \sum_{n=1}^{\infty} n$$

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

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

4.
$$\sum_{n=1}^{\infty} \frac{1}{2^n}$$

$$5.\sum_{n=1}^{\infty}a.q^n, q>0$$

6.
$$\sum_{n=1}^{\infty} \frac{2n+3}{3n+2}$$

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

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

$$9.\sum_{n=1}^{\infty} \left(\frac{-3n}{2n+3}\right)^{\frac{n}{2}}$$

6.
$$\sum_{n=1}^{\infty} \frac{2n+3}{3n+2}$$
7.
$$\sum_{n=1}^{\infty} \frac{n}{n+1}$$
8.
$$\sum_{n=1}^{\infty} \left(\frac{3n+2}{3-2n}\right)^n$$
9.
$$\sum_{n=1}^{\infty} \left(\frac{-3n}{2n+3}\right)^3$$
10.
$$\sum_{n=1}^{\infty} \left(\frac{2n^2+3}{3n^2-1}\right)^{-2}$$

Bài 2. Xét tính hội tụ và phân kỳ của các chuỗi số sau và tính tổng (nếu có):

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

2.
$$\sum_{n=1}^{\infty} \frac{3}{4^n}$$

3.
$$\sum_{i=1}^{\infty} 3.2^{i}$$

2.
$$\sum_{n=1}^{\infty} \frac{3}{4^n}$$
 3. $\sum_{n=1}^{\infty} 3.2^n$ 4. $\sum_{n=1}^{\infty} \frac{1}{(2n-1)(2n+1)}$ 5. $\sum_{n=1}^{\infty} \ln\left(1+\frac{1}{n}\right)$.

$$5. \sum_{n=1}^{\infty} \ln\left(1 + \frac{1}{n}\right)$$

Bài 3. Xét sự hội tụ (phân kỳ) của các chuỗi sau:

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

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

$$3. \sum_{n=1}^{\infty} \frac{\cos \frac{n\pi}{2}}{n^2 + 3}$$

$$4. \sum_{n=1}^{\infty} \frac{\sqrt{n^2 + 1}}{n^4 + 3}$$

$$5. \sum_{n=1}^{\infty} \frac{1}{n}$$

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

$$7. \sum_{n=1}^{\infty} \frac{1}{2^n \cdot \sqrt{n}}$$

$$8. \sum_{n=1}^{\infty} \frac{1}{\sqrt{n}+2}$$

$$9. \sum_{n=1}^{\infty} \frac{1}{n(n+1)}$$

6.
$$\sum_{n=1}^{\infty} \frac{1}{n^2}$$
 7. $\sum_{n=1}^{\infty} \frac{1}{2^n \cdot \sqrt{n}}$ 8. $\sum_{n=1}^{\infty} \frac{1}{\sqrt{n+2}}$ 9. $\sum_{n=1}^{\infty} \frac{1}{n(n+1)}$ 10. $\sum_{n=1}^{\infty} \frac{n^2+1}{\sqrt{n^5+n^3+1}}$

$$11. \sum_{n=1}^{\infty} \frac{1}{\sqrt{n}}$$

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$$\sum_{n=1}^{\infty} \frac{1}{\sqrt{n}}$$
 12. $\sum_{n=2}^{\infty} \frac{1}{\sqrt{n} - \sqrt[3]{n}}$ 13. $\sum_{n=1}^{\infty} \frac{1}{n(n+1)}$ 14. $\sum_{n=1}^{\infty} \sin \frac{1}{n}$ 15. $\sum_{n=1}^{\infty} \sin^2 \frac{1}{n}$

$$13. \sum_{n=1}^{\infty} \frac{1}{n(n+1)}$$

$$14. \sum_{n=1}^{\infty} \sin \frac{1}{n}$$

$$15. \sum_{n=1}^{\infty} \sin^2 \frac{1}{n}$$

16.
$$\sum_{n=2}^{\infty} \frac{1}{n^2 \ln n}$$
 17. $\sum_{n=1}^{\infty} \frac{1}{n \ln n}$ 18. $\sum_{n=1}^{\infty} \frac{1}{n2^n}$

$$17. \sum_{n=1}^{\infty} \frac{1}{n \ln n}$$

$$18. \sum_{n=1}^{\infty} \frac{1}{n2^n}$$

19.
$$\sum_{n=1}^{\infty} \frac{n}{2^n}$$

19.
$$\sum_{n=1}^{\infty} \frac{n}{2^n}$$
 20.
$$\sum_{n=1}^{\infty} \left(\frac{2n^2 + 2n - 1}{5n^2 - 2n + 1} \right)^n$$

$$21.\sum_{n=1}^{\infty} \left(\frac{3n}{2n+1}\right)^n$$

$$21.\sum_{n=1}^{\infty} \left(\frac{3n}{2n+1}\right)^n \qquad 22.\sum_{n=1}^{\infty} \frac{1}{(2n-1)2^{2n-1}} \quad 23.\sum_{n=2}^{\infty} \frac{1}{(\ln n)^n}$$

$$23. \sum_{n=2}^{\infty} \frac{1}{\left(\ln n\right)^n}$$

$$24. \sum_{n=1}^{\infty} \left(\frac{2}{n}\right)^n$$

$$25. \sum_{n=1}^{\infty} \frac{n}{2^n}$$

$$26. \sum_{n=1}^{\infty} \frac{2^n}{n!}$$

27.
$$\sum_{n=1}^{\infty} \frac{(n!)^2}{2^{n^2}}$$
 28. $\sum_{n=1}^{\infty} \frac{n^2}{n!}$

$$28. \sum_{n=1}^{\infty} \frac{n^2}{n!}$$

29.
$$\sum_{n=1}^{\infty} \frac{(n!)^2}{(2n)!}$$
 30. $\sum_{n=1}^{\infty} \frac{n^2}{3^n}$

30.
$$\sum_{n=1}^{\infty} \frac{n^2}{3^n}$$

31.
$$\sum_{n=1}^{\infty} \ln\left(1 + \frac{1}{n}\right)$$
 32. $\sum_{n=2}^{\infty} \frac{1}{n^2 - \ln n}$ 33. $\sum_{n=1}^{\infty} \frac{1}{(2n+1)!}$

$$32. \sum_{n=2}^{\infty} \frac{1}{n^2 - \ln n}$$

33.
$$\sum_{n=1}^{\infty} \frac{1}{(2n+1)!}$$

34.
$$\sum_{n=1}^{\infty} n \sin \frac{\pi}{2n}$$
 35. $\sum_{n=1}^{\infty} \frac{3}{2^n}$

35.
$$\sum_{n=1}^{\infty} \frac{3}{2^n}$$

36.
$$\sum_{n=1}^{\infty} \frac{(-1)^n}{n}$$

37.
$$\sum_{n=1}^{\infty} \frac{\left(-1\right)^n}{n^2}$$

36.
$$\sum_{n=1}^{\infty} \frac{\left(-1\right)^n}{n}$$
 37.
$$\sum_{n=1}^{\infty} \frac{\left(-1\right)^n}{n^2}$$
 38.
$$\sum_{n=1}^{\infty} \frac{\left(-1\right)^{n-1}}{n+2^n}$$

$$39. \sum_{n=1}^{\infty} \frac{\cos \frac{n\pi}{2}}{(n+1)(n+2)} \quad 40. \sum_{n=1}^{\infty} \frac{(-1)^n \sqrt{n}}{n^2 + 3}$$

40.
$$\sum_{n=1}^{\infty} \frac{(-1)^n \sqrt{n}}{n^2 + 3}$$

41.
$$\sum_{n=2}^{\infty} \frac{(-1)^n n^n}{n^2 - 1}$$

42.
$$\sum_{n=1}^{\infty} \frac{(-1)^n \ln n}{n}$$

43.
$$\sum_{n=1}^{\infty} \frac{\left(-3\right)^n}{n^3}$$

41.
$$\sum_{n=2}^{\infty} \frac{(-1)^n n}{n^2 - 1}$$
 42.
$$\sum_{n=1}^{\infty} \frac{(-1)^n \ln n}{n}$$
 43.
$$\sum_{n=1}^{\infty} \frac{(-3)^n}{n^3}$$
 44.
$$\sum_{n=1}^{\infty} (-1)^n \sin \frac{\alpha}{n}$$
 45.
$$\sum_{n=1}^{\infty} \frac{(-1)^n}{n^2 - 3}$$

45.
$$\sum_{n=1}^{\infty} \frac{(-1)^n}{n^2 - 3}$$