Definitions

1. Definition: A sequence $\{a_n\}$ has the limit L i.e. $\lim_{n\to\infty} a_n = L$ if

2. A series $\sum_{n=1}^{\infty} a_n$ converges to S if

3. Find $\lim_{n\to\infty} \log(n+1) - \log(n)$

4. Write the first 5 terms of the sequence defined by $a_1 = 1, a_n = 1 + \frac{1}{a_{n-1}}$

5. Prove $\lim_{n\to\infty} \frac{\sin(n)}{n} = 0$

6. Compute $\sum_{n=0}^{\infty} \left(\frac{2}{3}\right)^n$

7. Without using the eyeball test, explain why $\sum \frac{2}{n^2-1}$ converges whilst $\sum \frac{2}{n-1}$ diverges.

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

9. Under what conditions does $\sum (-1)^n a_n$ converge?

10. Is $\sum (-1)^n \frac{n}{n+1}$ absolutely convergent, conditionally converent or neither. Support your answer.

11. Repeat for $\sum \frac{(-1)^n}{n\log(n)}$

12. Find the radius of convergence and the interval of convergence for $\sum_{n=1}^{\infty} \frac{(x-1)^n}{\sqrt{n}}$

13. Find the power series representation for $\frac{x}{1+x}$

14. Find the power series representation for $\log(1-x)$

15. Write the Maclaurin series for $\sin(x), \cos(x), e^x$

16. Find the Maclaurin series for xe^{2x}

17. Find the Taylor series for $1 + x + x^2$ at $x = 2$

18. Evaluate the indefinite integral as an infinite series $\int \frac{\cos(x)}{x}$