

Test 3 review

1. Find the sum of $\sum_{k=0}^{\infty} e^{-k}$.
2. Find the sum of $\sum_{k=0}^{\infty} \frac{2^{k+1}}{3^k}$.
3. Find the sum of $\sum_{k=2}^{\infty} \left(\frac{7^k}{4^{k+2}} \right)$

Do the following series converge absolutely, converge conditionally, or diverge?

4. $\sum_{k=1}^{\infty} \frac{2^k}{k^3}$
5. $\sum_{k=1}^{\infty} \frac{5^k}{k!}$
6. $\sum_{k=1}^{\infty} \frac{(-1)^k \ln(k)}{k^{\frac{5}{4}}}$
7. $\sum_{k=1}^{\infty} \frac{\sin(k)}{k^4 + 2k + 1}$
8. $\sum_{k=1}^{\infty} \frac{(-1)^k (3k^2 + 7k + 35)}{k^3 + 5k^2 + 6}$
9. $\sum_{k=2}^{\infty} \frac{(-1)^k}{k \ln(k)}$
10. $\sum_{k=1}^{\infty} \frac{(-2)^k}{k}$
11. $\sum_{k=1}^{\infty} \frac{5k^4 + 3k + 1}{k^6 + 5k^5 + 32k + 12}$
12. $\sum_{k=0}^{\infty} \frac{2^k}{3^k + 1}$

$$13. \sum_{k=0}^{\infty} \frac{1}{x^2 \ln x}$$

$$14. \sum_{k=0}^{\infty} \frac{7}{x(\ln x)^3}$$

What is the interval of convergence for the following power series?

(What is the behaviour of the series at the bounds?)

$$15. \sum_{k=0}^{\infty} \frac{x^k}{2^k}$$

$$16. \sum_{k=0}^{\infty} \frac{100}{k!} x^k$$

$$17. \sum_{k=0}^{\infty} \frac{(x-2)^k}{k^2 + 3}$$

$$18. \sum_{k=2}^{\infty} \frac{(x+1)^k}{\ln(k)}$$

$$19. \sum_{k=0}^{\infty} 5^k (x-4)^k$$

$$20. \sum_{k=1}^{\infty} \frac{(x+5)^k}{3k}$$

21. What is the 4th Maclaurin Polynomial for $\tan x$?

22. What is the 3rd Taylor Polynomial for $\sin^2 x$ around $x = \frac{\pi}{2}$?

23. Using Maclaurin Polynomials, find an approximation for $e^{(.2)}$ accurate up to 5 decimal places (note: $e^{(.2)} < 2$).

24. Using Maclaurin Polynomials, find an approximation for $\ln(1.3)$ accurate up to 5 decimal places.

25. What is the Maclaurin series for $x^2 e^x$? For what values of x does it converge?
26. What is the Maclaurin series for $\frac{1}{(1-x)^2}$? For what values of x does it converge?
27. What is the Maclaurin series for $\ln(1 - 3x^2)$? For what values of x does it converge?
28. What is the Maclaurin series for $\sin x - x \cos x$? (Hint: $\sin x - x \cos x = \int x \sin x dx$) For what values of x does it converge?