MAC2312 Section U03
Suggested problems for final exam.
The final exam is **cumulative**.
You should **also** practice the
suggested problems for Tests 1 through 3.

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1. Determine whether the series converges or diverges.

$$\sum_{k=1}^{\infty} \frac{1}{5k+2}$$

2. Determine whether the series converges or diverges.

$$\sum_{k=1}^{\infty} \frac{1}{k(k+1)}$$

3. Determine whether the series converges or diverges.

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

4. Determine whether the series converges or diverges.

$$\sum_{k=2}^{\infty} \frac{\ln k}{k}$$

5. Determine whether the series converges or diverges.

$$\sum_{k=1}^{\infty} \frac{1}{\sqrt{k^2+1}}$$

6. Determine whether the series converges or diverges.

$$\sum_{k=2}^{\infty} \frac{1}{\ln k}$$

7. Determine whether the series converges or diverges.

$$\sum_{k=1}^{\infty} \frac{1}{3^k + 5}$$

8. Determine whether the series converges or diverges.

$$\sum_{k=1}^{\infty} \frac{1}{(2k+3)^{17}}$$

9. Determine whether the series converges or diverges.

$$\sum_{k=0}^{\infty} \frac{1}{k!}$$

10. Determine whether the series converges or diverges.

$$\sum_{k=1}^{\infty} \frac{k^2}{5^k}$$

11. Determine whether the series converges or diverges.

$$\sum_{k=1}^{\infty} \frac{1}{1+\sqrt{k}}$$

12. Determine whether the series converges or diverges.

$$\sum_{k=2}^{\infty} \frac{\ln k}{2^k}$$

13. Determine whether the series converges or diverges.

$$\sum_{k=1}^{\infty} \frac{(-1)^{k+1}}{3k}$$

14. Determine whether the series converges or diverges.

$$\sum_{k=1}^{\infty} \frac{\cos(k\pi)}{k}$$

15. Determine whether the series converges absolutely, converges conditionally, or diverges.

$$\sum_{k=1}^{\infty} \frac{(-1)^k}{k}$$

16. Determine whether the series converges absolutely, converges conditionally, or diverges.

$$\sum_{k=1}^{\infty} \frac{(-1)^k}{k^{4/3}}$$

17. Determine whether the series converges absolutely, converges conditionally, or diverges.

$$\sum_{k=0}^{\infty} \frac{(-1)^k}{k!}$$

18. Determine whether the series converges absolutely, converges conditionally, or diverges.

$$\sum_{k=2}^{\infty} \frac{(-1)^k \ln k}{k}$$

19. Determine whether the series converges absolutely, converges conditionally, or diverges.

$$\sum_{k=0}^{\infty} \left(\frac{-3}{5}\right)^k$$

20. Find the Maclaurin series for the function.

$$f(x) = e^{-x}$$

21. Find the Maclaurin series for the function.

$$f(x) = e^{5x}$$

22. Find the Maclaurin series for the function.

$$f(x) = \frac{1}{1+x}$$

23. Find the Maclaurin series for the function.

$$f(x) = \ln(1 + x)$$

24. Find the Maclaurin series for the function.

$$f(x) = (1 + x)^{1/4}.$$

25. Find the Maclaurin series for the function.

$$f(x) = (1 + 2x)^{1/3}.$$

26. Find the Maclaurin series for the function.

$$f(x) = xe^x$$

27. Find the Maclaurin series for the function.

$$f(x) = x \sin x$$

28. Find the Maclaurin polynomial of degree 2 for $f(x) = \cos x$, and use it to estimate $\cos(0.1)$ to the nearest thousandth.

29. Find the Maclaurin polynomial of degree 3 for $f(x) = \ln(1 + x)$, and use it to estimate $\ln(1.1)$ to the nearest ten thousandth.