

Answer the problems on separate paper. You do not need to rewrite the problem statements on your answer sheets. Work carefully. Do your own work. **Show all relevant supporting steps!** Attach this sheet to the front of your solution pages.

Bald solutions to problems – answers without accompanying, supporting work – will receive **no** credit.

1. (16 pts) Choose two of the following. Compute the limit of the sequence, if it exists. Show all supporting work.

a. $\left\{ \frac{4-3n}{2n+7} \right\}$ b. $\left\{ \frac{\ln n}{2\sqrt{n}} \right\}$ c. $\left\{ \frac{n^2}{\sqrt{n^2+2}} \right\}$

2. (8 pts) Choose one. Find the sum of the series, if it exists. Show all supporting work.

a. $\sum_{k=1}^{\infty} \frac{e^k}{7(2^k)}$ b. $\sum_{k=2}^{\infty} 4 \left(\frac{-2}{3} \right)^k$

3. (12 pts) Choose one. Determine whether the series converges or diverges. Show all supporting work.

a. $\sum_{k=2}^{\infty} \frac{k+1}{k^2+1}$ b. $\sum_{k=1}^{\infty} \frac{1}{\sqrt{k^3+3}}$

4. (12 pts) Choose one. Determine whether the series converges or diverges. Show all supporting work.

a. $\sum_{k=1}^{\infty} \frac{2^k}{(k+2)!}$ b. $\sum_{k=1}^{\infty} \frac{3^k}{k^3}$

5. (12 pts) Choose one. Determine whether the series converges absolutely, converges conditionally or diverges. Show all supporting work.

a. $\sum_{k=1}^{\infty} \frac{(-1)^{k+1}}{k+2}$ b. $\sum_{k=1}^{\infty} (-1)^{k+1} \frac{5k+4}{10^k}$

7. (16 pts) Choose one. Find the convergence set for the power series. Show all supporting work.

a. $\sum_{k=1}^{\infty} \frac{x^k}{(k+1)2^k}$ b. $\sum_{k=1}^{\infty} \frac{k x^k}{4^k}$

7. (12 pts) Choose one. Determine how many terms of the series are necessary to estimate its sum to three-place accuracy. Using those terms, estimate the sum of the series. Show all supporting work.

a. $\sum_{k=1}^{\infty} (-1)^{k+1} \frac{k^2}{10^{k+1}}$ b. $\sum_{k=1}^{\infty} (-1)^{k+1} \frac{5k+4}{10^k}$

8. (12 pts) Choose one. Show all supporting work.

a. Find the first 4 non-zero terms in Taylor's expansion of $f(x) = \ln x$ at $c = 2$.

b. Find the MacLaurin series expansion for $f(x) = \frac{e^x + e^{-x}}{2}$