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. $\left\{\dfrac{2n+5}{6-3n}\right\}$ b. $\left\{\dfrac{\ln(n+1)}{n^{3/2}}\right\}$ c. $\left\{\dfrac{n^2+n+1}{n^{3/2}}\right\}$

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

a. $\displaystyle\sum_{k=1}^{\infty}\frac{\pi^k}{10\left(3^k\right)}$ b. $\displaystyle\sum_{k=2}^{\infty}\frac{7}{(-2)^k}$

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

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

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

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

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

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

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

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

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

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

a. Find the first 4 non-zero terms in Taylor's expansion of $f(x)=\ln(1+x)$ at $c = 1$.

b. Find the MacLaurin series expansion for $f(x)=xe^{-3x}$