Fall 2001, Exam 4, Math 142

PRINT Your Name: ____________________________

There are 10 problems on 5 pages. Each problem is worth 10 points. SHOW your work. \([\text{CIRCLE}]\) your answer. NO CALCULATORS! If you want to pick up your exam before Monday, write a short note to that effect on the top of this page and I will leave your exam outside my office door, before I go home tonight.

1. Does \(\sum_{n=1}^{\infty} \frac{4}{n}\) converge? Justify your answer.

2. Does \(\sum_{n=1}^{\infty} \frac{n+3}{n^2 \sqrt{n}}\) converge? Justify your answer.

3. Does \(\sum_{n=1}^{\infty} \ln \left( \frac{n}{n+1} \right)\) converge? Justify your answer.

4. Does \(\sum_{n=1}^{\infty} (-1)^{n+1} \frac{1}{n^2}\) converge? Justify your answer.

5. Does \(\sum_{n=1}^{\infty} \frac{4^n + n}{n!}\) converge? Justify your answer.


7. Where does \(f(x) = \sum_{n=0}^{\infty} (-1)^{n+1} \frac{x^{2n+1}}{(2n+1)!}\) converge? Where does \(f(x)\) diverge? Justify your answer.

8. Where does \(f(x) = \sum_{n=1}^{\infty} (-1)^{n+1} \frac{(x-1)^n}{2^n n(n+2)}\) converge? Where does \(f(x)\) diverge? Justify your answer.

9. Which familiar function is equal to \(x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + \frac{x^5}{5} - \ldots\)? Justify your answer.

10. Approximate \(\int_{0}^{1/10} e^{-x^2} dx\) with an error of at most \(10^{-8}\). Justify your answer.