142 Exam 4 Fall 2001

PRINT Your Name:_____

There are 10 problems on 5 pages. Each problems is worth 10 points. SHOW your work. 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.

This series is 4 times the harmonic series. This series diverges.

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

Do a limit comparison to $\sum_{n=1}^{\infty} \frac{1}{n^{3/2}}$, which converges because it is a p-series with $p = \frac{3}{2}$ and $\frac{3}{2} > 1$.

$\lim_{n\to\infty} \frac{a_n}{b_n} = \lim_{n\to\infty} \frac{\frac{n+3}{n^2\sqrt{n}}}{n^{3/2}} = \lim_{n\to\infty} \frac{n+3}{n} = \lim_{n\to\infty} 1 + \frac{3}{n} = 1$, 1 is a nonzero #

$a_n = \frac{n+3}{n^2\sqrt{n}}$, $b_n = \frac{1}{n^{3/2}}$

1 is not 0 or ∞, so both series converge or both series diverge. We know that $\sum_{n=1}^{\infty} \frac{1}{n^{3/2}}$ converges, so $\sum_{n=1}^{\infty} \frac{n+3}{n^2\sqrt{n}}$ also converges