Quiz 2 **Calculus 2** **11/18/2009**

Each problem is worth 5 points. Clear and complete justification is required for full credit.

1. Determine whether $\sum_{n=1}^{\infty} \frac{1}{3n^2}$ converges or diverges.

The series converges b/c it is $\left(\frac{1}{3}\right)$, a constant, multiplyed by $\sum_{n=1}^{\infty} \frac{1}{n^2}$ which is a p-series with a p value ≥ 1 which converges.

Excellent!

2. Determine whether $\sum_{n=1}^{\infty} \frac{(-1)^n}{\sqrt{n}}$ converges or diverges.

Use the alternating series test!

- the series alternates between positive and negative because of $(-1)^n$ ✓

- does $\lim_{n\to\infty} \left|\frac{(-1)^n}{\sqrt{n}}\right| \overset{?}{=} 0$?

well, $\lim_{n\to\infty} \left|\frac{(-1)^n}{\sqrt{n}}\right| = \lim_{n\to\infty} \frac{1}{\sqrt{n}}$ and I know

$\lim_{n\to\infty} \frac{1}{\sqrt{n}} = 0$ so $\lim_{n\to\infty} \left|\frac{(-1)}{\sqrt{n}}\right| = 0$ ✓

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- does $\left\{\left|\frac{(-1)^n}{\sqrt{n}}\right|\right\}$ decrease?

well $\left|\frac{(-1)^n}{\sqrt{n}}\right| = \frac{1}{\sqrt{n}}$ Great

This decreases if the derivative of the associated function is always negative. $f(x) = 1/\sqrt{n}$, $f'(x) = -\frac{1}{2}n^{-3/2}$

This will always be negative. ✓

So by the A.S.T., $\sum_{n=1}^{\infty} \frac{(-1)^n}{\sqrt{n}}$ will converge.