CALCULUS TWO QUIZ 3 NOV. 13, 2008. NAME: SOLUTIONS

Show all calculations and simplify answers. Page 1 of 1. (10 points total.)

(2 points) 1. Compute $\sum_{n=1}^{\infty} 2^{(-4n)} = \frac{1}{2^4} + \frac{1}{2^8} + \frac{1}{2^{12}} + \dots$

$= \frac{1/16}{1 - 1/16} =$

$a = \frac{1}{16}, r = \frac{1}{16}$

$|r| <$

(4 points) 2. Test for convergence. Name the test used and show how you used it.

(a) $\sum_{n=1}^{\infty} \frac{n}{3n+1}$ $\lim_{n\to\infty} a_n = \frac{1}{3} \neq 0$ $\boxed{\text{Series diverges.}}$

(b) $\sum_{n=1}^{\infty} \frac{n}{\sqrt{n^6 + n^2 + 1}}$ $0 \leq a_n < \frac{n}{\sqrt{n^6}} = \frac{1}{n^2}$ for ≥ 1

$\sum \frac{1}{n^2}$ converges, $p = 2 > 1$.

$\boxed{\text{Series converges by direct comparison.}}$

(4 points) 3. Classify as **divergent, conditionally convergent** or **absolutely convergent**.

Explanation required.

(a) $\sum_{n=1}^{\infty} \frac{(-1)^n \sqrt{n}}{n^2 + n}$

$\sum_{n=1}^{\infty} \left| \frac{(-1)^n \sqrt{n}}{n^2 + n} \right| = \sum_{n=1}^{\infty} \frac{\sqrt{n}}{n^2 + n}$

$0 < \frac{\sqrt{n}}{n^2+n} < \frac{\sqrt{n}}{n^2} = \frac{1}{n^{3/2}}$ for $n \geq 1$

$\sum \frac{1}{n^{3/2}}$ converges $p = \frac{3}{2} > 1$.

$\boxed{\text{Series is absolutely convergent.}}$

(b) $\frac{1}{\sqrt{2}} - \frac{1}{4} + \frac{1}{\sqrt{3}} - \frac{1}{8} + \frac{1}{\sqrt{4}} - \frac{1}{16} + \frac{1}{\sqrt{5}} - \frac{1}{32} + \dots\dots$

positive terms form series $\sum_{n=2}^{\infty} \frac{1}{\sqrt{n}} = \infty$. $p = \frac{1}{2} < 1$

negative terms series $-\frac{1}{4} - \frac{1}{8} - \frac{1}{16} - \dots = \frac{-1/2}{1 - 1/2} = -1$

$\infty - 1 = \infty$ $\boxed{\text{Series diverges.}}$

(10 points total.)