Dawson College: Calculus II (SCIENCE): 201-NYB-05-S2: Winter 2012

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Quiz 11

This quiz is graded out of 10 marks. No books, calculators, notes or cell phones are allowed. You must show all your work, the correct answer is worth 1 mark the remaining marks are given for the work. If you need more space for your answer use the back of the page.

Question 1. *(5 marks)* §8.3 #24 Determine whether the series is convergent or divergent.

$\sum_{n=1}^{\infty} \frac{1+\sin n}{10^n}$ Let $a_n = \frac{1+\sin n}{10^n}$

$$0 \leq a_n \leq \frac{1+1}{10^n} = 2\left(\frac{1}{10}\right)^n = b_n$$

$\therefore \sum_{n=1}^{\infty} a_n$ is convergent by comparison test since $\sum_{n=1}^{\infty} b_n$ is convergent (geometric series where $|r| = \frac{1}{10} < 1 \therefore$ convergent)

Question 2. *(5 marks)* §8.4 #37 Determine whether the series is absolutely convergent, conditionally convergent, or divergent.

$\sum_{n=1}^{\infty} \frac{2 \cdot 4 \cdot 6 \cdot \ldots \cdot (2n)}{n!}$ Lets apply the ratio test. Let $a_n = \frac{2 \cdot 4 \cdot 6 \cdot \ldots \cdot (2n)}{n!}$

$$\lim_{n\to\infty} \left|\frac{a_{n+1}}{a_n}\right|$$

$$= \lim_{n\to\infty} \left| \frac{\frac{2 \cdot 4 \cdot 6 \cdot \ldots \cdot (2n) \cdot (2(n+1))}{(n+1)!}}{\frac{2 \cdot 4 \cdot 6 \cdot \ldots (2n)}{n!}} \right|$$

$$= \lim_{n\to\infty} \frac{\cancel{2 \cdot 4 \cdot 6 \ldots (2n)}(2n+2)}{\cancel{n!}(n+1)} \cdot \frac{\cancel{n!}}{\cancel{2 \cdot 4 \cdot 6 \cdot \ldots \cdot (2n)}}$$

$$= \lim_{n\to\infty} \frac{2n+2}{n+1}$$

$= 2 > 1$ $\therefore$ diverges by ratio test.