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Quiz 12

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 #7 Determine whether the series is convergent or divergent.

$\sum_{n=0}^{\infty} \frac{1+\sin n}{10^n}$ Let $a_n = \frac{1+\sin n}{10^n}$

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

$\sum b_n$ converges since geometric series where $|r| = \frac{1}{10} < 1$ $\therefore \sum a_n$ converges by comparison test.

Question 2. *(5 marks)* §8.4 #11 Determine whether the series is absolutely convergent, conditionally convergent, or divergent.

$\sum_{n=0}^{\infty} \frac{(-10)^n}{n!}$

Lets apply the ratio test

$$\lim_{n\to\infty} \left|\frac{a_{n+1}}{a_n}\right| = \lim_{n\to\infty} \left|\frac{\frac{(-10)^{n+1}}{(n+1)!}}{\frac{(-10)^n}{n!}}\right| = \lim_{n\to\infty} \frac{10^{n+1}}{(n+1)!}\frac{n!}{10^n}$$

$$= \lim_{n\to\infty} \frac{10^n 10}{(n+1)n!}\frac{n!}{10^n}$$

$$= 0 < 1$$

$\therefore$ absolutely convergent by ratio test.