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Quiz 9

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. *(2 marks)* §8.1 #6 Find a formula for the general term a_n of the sequence, assuming that the pattern of the first few terms continues.

$\{5,1,5,1,5,1,\ldots\}$ $\quad a_n = 3 + (-1)^{n+1}(2)$

Question 2. *(4 marks)* §8.1 #21 Determine whether the sequence converges or diverges. If it converges, find the limit.

$a_n = \dfrac{\cos^2 n}{2^n}$

$$b_n = \frac{0}{2^n} \le \frac{\cos^2 n}{2^n} \le \frac{1}{2^n} = \left(\frac{1}{2}\right)^n = c_n$$

$$\lim_{n\to\infty} b_n = \lim_{n\to\infty} c_n = 0$$

$\therefore$ by squeeze thm. $\lim_{n\to\infty} a_n = 0$

Question 3. *(4 marks)* §8.1 #19 Determine whether the sequence converges or diverges. If it converges, find the limit.

$\{n^2 e^{-n}\}$ $\quad$ So $a_n = \dfrac{n^2}{e^n}$, let $f(x) = \dfrac{x^2}{e^x}$ where $x \in \mathbb{R}$

$$\lim_{x\to\infty} \frac{x^2}{e^x} \quad \text{I.F. } \frac{\infty}{\infty}$$

$$= \lim_{x\to\infty} \frac{2x}{e^x} \quad \text{by } \hat{H}, \text{ I.F. } \frac{\infty}{\infty}$$

$$= \lim_{x\to\infty} \frac{2}{e^x} \quad \text{by } \hat{H}$$

$$= 0$$

$\therefore$ $a_n \to 0$ as $n \to \infty$

Question 4. *(5 marks)* Set up the integral to find the volume of the solid obtained from the region bounded by the graphs of $x = y^2 - 2y$, $x = y$ rotated about the line $x = -1$.

see test # 2