

MAC 2312 Calculus II, Worksheet #10 (Sec 11.1-11.2)

Date: _____

Name: _____

For problems 1-2, use the graph of the following sequences to decide whether the sequence is convergent or divergent:

Q1) $a_n = 1 + \left(-\frac{2}{e}\right)^n$

Q2) $a_n = \sqrt{n} \sin\left(\frac{\pi}{n}\right)$

Q3) Determine whether the sequence $a_n = \frac{(\ln n)^2}{n}$ converges or diverges. If it is convergent, then find the limit

Q4) A fish farmer has 5000 catfish in his pond. The number of catfish increases by 8% per month and the farmer harvests 300 catfish per month.

a. Show that the catfish population P_n after n month is given recursively by

$$P_n = 1.08P_{n-1} - 300, P_0 = 5000$$

b. How many catfish are in the pond after six months.

Q5) A sequence $\{a_n\}$ defined by $a_1 = 1$ and $a_{n+1} = \frac{1}{1+a_n}$ for $n \geq 1$. Assuming that $\{a_n\}$ is convergent, find its limit.

Q6) Find the limit of the sequence $\left\{ \sqrt{2}, \sqrt{2\sqrt{2}}, \sqrt{2\sqrt{2\sqrt{2}}}, \sqrt{2\sqrt{2\sqrt{2\sqrt{2}}}}, \dots \right\}$.

Q7) Determine whether the following geometric series is convergent or divergent. If it is convergent, find the sum.

A. $4 + 3 + \frac{9}{4} + \frac{27}{16} + \dots$

B. $10 - 2 + 0.4 - 0.08 + \dots$

C. $\sum_{n=1}^{\infty} \frac{\pi^n}{3^{n+1}}$.