W09 Regular

Due date: Sunday 3/15, 11:59pm

01

Integral Test (IT)

Determine whether the series is convergent by using the Integral Test.

Show your work. You must check that the test is applicable.

(a) $\sum_{n=1}^{\infty} \frac{1}{n^{1.1}}$ (b) $\sum_{n=1}^{\infty} ne^{-n^2}$ (c) $\sum_{n=1}^{\infty} \frac{1}{\sqrt[3]{n^2}}$

02 ★

Limit Comparison Test (LCT)

Use the Limit Comparison Test to determine whether the series converges:

$$\sum_{n=1}^{\infty} \frac{e^n + n}{e^{2n} - n^2}$$

Show your work. You must check that the test is applicable.

03

IT, DCT, LCT

Determine whether the series converges by checking applicability and then applying the designated convergence test.

(a) Integral Test: $\displaystyle\sum_{n=2}^{\infty} \frac{\ln n}{n^2}$

(b) Direct Comparison Test: $\displaystyle\sum_{n=1}^{\infty} \frac{n^3}{n^5 + 4n + 1}$

(c) Limit Comparison Test: $\displaystyle\sum_{n=2}^{\infty} \frac{n^2}{n^4 - 1}$

04

Absolute and conditional convergence

Determine whether the series are absolutely convergent, conditionally convergent, or divergent by applying series tests.

Show your work. You must check that the test is applicable.

(a) $\sum_{n=1}^{\infty} \frac{(-1)^n}{1+\frac{1}{n}}$ (b) $\sum_{n=1}^{\infty} \frac{\cos n\pi}{n^3+1}$

05

Limits and convergence

For each sequence, either write the limit value (if it converges), or write ‘diverges’.

(a) 1.01^n (b) $2^{1/n}$ (c) $\dfrac{n!}{9^n}$ (d) $\dfrac{3n^2+n+2}{2n^2-3}$

(e) $\dfrac{\cos n}{n}$ (f) $\ln 5^n - \ln n!$ (g) $\left(2+\dfrac{4}{n^2}\right)^{1/3}$ (h) $n \sin \dfrac{\pi}{n}$

06 ★

Limits and convergence

For each sequence, either write the limit value (if it converges), or write ‘diverges’.

(a) $\ln\left(\dfrac{2n+1}{3n+4}\right)$ (b) $\dfrac{e^n}{2^n}$ (c) $\dfrac{(\ln n)^2}{n}$ (d) $\dfrac{(-1)^n(\ln n)^2}{n}$

(e) $\dfrac{3-4^n}{2+7\cdot 4^n}$ (f) $\left(1+\dfrac{1}{n}\right)^n$ (g) $\dfrac{1}{\ln\left(1+\frac{1}{n}\right)}$

07 ★

Geometric series

Compute the following summation values using the sum formula for geometric series.

(a) $\displaystyle\sum_{n=-4}^{\infty}\left(-\frac{4}{9}\right)^{n}$ (b) $\displaystyle\sum_{n=0}^{\infty}e^{3-2n}$

08 ★

Geometric series

Compute the following summation values using the sum formula for geometric series.

(a) $\sum_{n=0}^{\infty} 5^{-n}$ (b) $\sum_{n=0}^{\infty} \frac{2+3^n}{5^n}$

09

Repeating digits

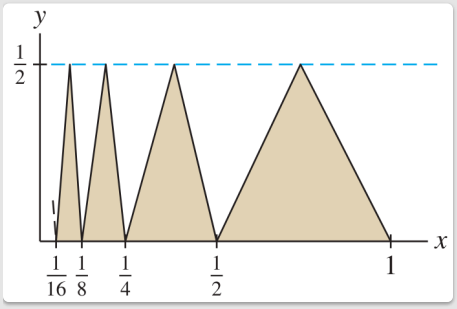
Using the geometric series formula, find the fractional forms of these decimal numbers:

(a) $0.\bar{2} = 0.222222\ldots$ (b) $0.4\bar{9} = 0.4999999\ldots$

10

Total area of infinitely many triangles

Find the area of all the triangles as in the figure:



(The first triangle from the right starts at 1, and going left they never end.)