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MC200402420: HIRA RAB NAWAZ

MTH621:Quiz-1 Quiz Start

Question # 1 of 10 (Start time: 10:30:24 AM, 04 June 2021)

The set of terms of $\{s_{n_k}\}$ is contained in the set of terms of $\{s_n\}$ implies

Since the set of terms of $\{s_{n_k}\}$ is contained in the set of terms of $\{s_n\}$,

$\sup\{s_n\} \geq \sup\{s_{n_k}\}$.

Select the correct option

- $\{s_n\}$ is convergent.
- $\sup\{s_n\} = \sup\{s_{n_k}\}$.
- $\sup\{s_n\} \geqslant \sup\{s_{n_k}\}$.
- $\sup\{s_n\} \leqslant \sup\{s_{n_k}\}$.

Click to Save Answer

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Time Left

MTH621:Quiz-1

Quiz Start Time: 10:30 AM, 04 Ju

Question # 2 of 10 (Start time: 10:31:25 AM, 04 June 2021)

Total

If a sequnce $\{s_n\}$ *is nonincreasing, then* – – – – –

Recall the following theorem:

- If $\{s_n\}$ is nondecreasing, then $\lim_{n\to\infty} s_n = \sup\{s_n\}$.
- If $\{s_n\}$ is nonincreasing, then $\lim_{n\to\infty} s_n = \inf\{s_n\}$.

Select the correct option

Math E

- $lim_{n\to\infty} s_n = inf\{s_n\}$
- None of these
- $lim_{n\to\infty} s_n = sup\{s_n\}$
- $lim_{n\to\infty} s_n = \infty$

Click to Save Answer & Move to Next Questio

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MTH621:Quiz-1

Question # 3 of 10 (Start time: 10:32:27 AM, 04 June 2021)

For harmonic series $\sum_{n=1}^{\infty} \frac{1}{n} = - - - - - -.$

Example: For the harmonic series $\lim_{n\to\infty} \frac{1}{n} = 0$.

But we have proved that

$$\sum_{n=1}^{\infty} \frac{1}{n}$$

is divergent.

Select the correct option

- 0
- -1
- None of these
- 1

Click to Sa

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MTH621:Quiz-1 Quiz Start Tir

Question # 4 of 10 (Start time: 10:33:01 AM, 04 June 2021)

A point $\bar{x}$ is a limit point of a set iff there is a sequence $\{x_n\}$ of point in S such that $x_n \neq x$ for $n \geq 1$, and ------

Select the correct option

Theorem: A point $\bar{x}$ is a limit point of a set S **if and only if** there is a sequence $\{x_n\}$ of points in S such that $x_n \neq \bar{x}$ for $n \geq 1$, and

$\lim_{n\to\infty} x_n = \bar{x}$

- $\lim_{n\to\infty} x_n = \bar{x}$
- $\lim_{n\to\infty} x_n \neq \bar{x}$
- $\lim_{n\to\infty} x_n > \bar{x}$
- None of these

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MTH621:Quiz-1

Question # 5 of 10 (Start time: 10:33:37 AM, 04 June 2021)

The limit of the sequence

$$s_n = \frac{1}{n} + \frac{2(1+3/n)}{1+1/n}.$$

Select the correct option

○	1 $\lim_{x\to\infty}\left(\frac{1}{x}+\frac{2\left(1+\frac{3}{x}\right)}{1+\frac{1}{x}}\right)=2$
○	2
○	3
○	4

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MTH621:Quiz-1

Question # 6 of 10 (Start time: 10:34:09 AM, 04 June 2021)

If $f(x) = \sqrt{4-x^2}$ and $g(x) = \sqrt{x-1}$, then domain of the quotient function f/g is

and

$$(fg)(x) = (\sqrt{4-x^2})(\sqrt{x-1}) = \sqrt{(4-x^2)(x-1)}.$$

The quotient f/g is defined on $(1,2]$ by

$$\left(\frac{f}{g}\right)(x) = \sqrt{\frac{4-x^2}{x-1}}.$$

Select the correct option

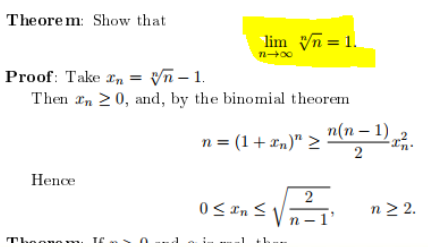
- $[7,8]$.
- $[-3,3]$.
- $[1,2]$.
- $(1,2]$.

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MTH621:Quiz-1

Question # 7 of 10 (Start time: 10:34:57 AM, 04 June 2021)

Which statement(s) is(are) true for the following sequence $\{\sqrt[n]{n}\}$



Theorem: Show that $\lim_{n\to\infty} \sqrt[n]{n} = 1$.

Proof: Take $x_n = \sqrt[n]{n} - 1$.
Then $x_n \geq 0$, and, by the binomial theorem

$$n = (1 + x_n)^n \geq \frac{n(n-1)}{2} x_n^2.$$

Hence

$$0 \leq x_n \leq \sqrt{\frac{2}{n-1}}, \qquad n \geq 2.$$

Select the correct option

- The sequence is convergent and converges to 1.
- The sequence is convergent and converges to 0.
- The sequence is divergent.
- The sequence is divergent to ∞.

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AB NAWAZ

Quiz Start Time

ime: 10:35:34 AM, 04 June 2021)

If $\{x_n\}$ *is* $----$, *then* $\{x_n\}$ *has a convergent subsequence.*

- If $\{x_n\}$ is bounded, then $\{x_n\}$ has a convergent subsequence.
- If $\{x_n\}$ is unbounded above, then $\{x_n\}$ has a subsequence $\{x_{n_k}\}$ such that

$$\lim_{k\to\infty} x_{n_k} = \infty.$$

bounded

unbounded

Click to Save Answer & Mo

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$$If\ \{s_n\}\ is\ ------,\ then\ \lim_{n\to\infty} s_n = \inf\{s_n\}.$$

Recall the following theorem:

- If $\{s_n\}$ is nondecreasing, then $\lim_{n\to\infty} s_n = \sup\{s_n\}$.
- If $\{s_n\}$ is nonincreasing, then $\lim_{n\to\infty} s_n = \inf\{s_n\}$.

Theorem: If $a_n \geq 0$ for $n \geq k$, then $\sum a_n$ converges if its partial sums ar

increasing

nondecreasing

decreasing

nonincreasing

Click to Save Answer &

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MC200405702: MISBAH NAZEER

Time Left 88 sec(s)

MTH621:Quiz-1

Quiz Start Time: 10:36 AM, 04 June 2021

Question # 1 of 10 (Start time: 10:36:39 AM, 04 June 2021)

Total Marks: 1

$If \sum a_n \text{ -----, } then \lim_{n\to\infty} a_n = 0$

Now Theorem implies that $\sum r^n$ converges if $|r| < 1$, as in Example **??**.

Corollary: If $\sum a_n$ converges, then $\lim_{n\to\infty} a_n = 0$

Proof: If $\sum a_n$ converges, then for each $\varepsilon > 0$ there is an integer K such that

Select the correct option

Math Equations

- converges
- diverges

Click to Save Answer & Move to Next Question

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If $\{x_n\}$ *unbounded above, then* $\{x_n\}$ *has a subsequence* $\{x_n\}$ *such that* $\lim_{k\to\infty} x_{n_k} =$ ----

- If $\{x_n\}$ is bounded, then $\{x_n\}$ has a convergent subsequence.
- If $\{x_n\}$ is unbounded above, then $\{x_n\}$ has a subsequence $\{x_{n_k}\}$ such that

$$\lim_{k\to\infty} x_{n_k} = \infty.$$

Reload Math E

∞
$-\infty$
0
1

Click to Save Answer & Move to Next Questio

MC200405702: MISBAH NAZEER

Time

MTH621:Quiz-1

Quiz Start Time: 10:36 AM

Question # 2 of 10 (Start time: 10:37:25 AM, 04 June 2021)

$$\text{The series } \sum_{n=k}^{\infty} a_n - - - - - - - - \text{, if } (-1)^n a_n > 0, \quad |a_{n+1}| < |a_n|, \text{ and } \lim_{n \to \infty} a_n = 0.$$

condition that implies divergence of an infinite series. Then $\sum_{n=k} a_n$ diverges.

Example: *The series* $\sum_k^\infty a_n$ *converges if* $(-1)^n a_n > 0$, $|a_{n+1}| < |a_n|$, *and* $\lim_{n\to\infty} a_n = 0$.

Reload

converges

diverges

Click to Save Answer & Move to Next

MC200405702: MISBAH NAZEER

MTH621:Quiz-1

Question # 3 of 10 (Start time: 10:38:00 AM, 04 June 2021)

For harmonic series $\sum_{n=1}^{\infty} \frac{1}{n} = - - - - - -.$

Select the correct option

Repeat

- None of these
- -1
- 1
- 0

Jazz 84% 10:38 AM

Quiz

2.7 Cauchy Sequence

A sequence $\{s_n\}$ of real numbers is called a Cauchy sequence if for every $\varepsilon > 0$, there is an integer N such that

$$|s_n - s_m| < \varepsilon \quad \text{if} \quad m, n \geq N.$$

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MTH621:

Time Left 89 sec(s)

Quiz Start Time: 10:36 AM, 04 June 2021

Question # 4 of 10 (Start time: 10:38:31 AM, 04 June 2021)

Total Marks: 1

A sequence $\{s_n\}$ of real numbers is called a Cauchy sequence if for every $\varepsilon > 0$, there is an integer N such that $|s_n - s_m| < \varepsilon$ if $m, n - - - - - N$.

Select the correct option

Reload Math Equations

- $>$
- $\geqslant$
- $\leqslant$
- $<$

Click to Save Answer & Move to Next Question

- If $\{x_n\}$ is bounded, then $\{x_n\}$ has a convergent subsequence.
- If $\{x_n\}$ is unbounded above, then $\{x_n\}$ has a subsequence $\{x_{n_k}\}$ such that

$$\lim_{k\to\infty} x_{n_k} = \infty.$$

Question # 5 o

- If $\{x_n\}$ is unbounded below, then $\{x_n\}$ has a subsequence $\{x_{n_k}\}$ such that

If $\{x_n\}$ unbounded above, then $\{x_n\}$ has a subsequence $\{x_n\}$ such that $\lim_{k\to\infty} x_{n_k} =$ ----

repeat

Select the correct option

○	0
○	∞
○	1
○	−∞

Click to Save Answer & Move to N

MC200405702: MISBAH NAZEER

Time Le

MTH621:Quiz-1

Quiz Start Time: 10:36 AM,

Question # 6 of 10 (Start time: 10:39:51 AM, 04 June 2021)

Every Cauchy sequence has

2.7 Cauchy Sequence

A sequence $\{s_n\}$ of real numbers is called a Cauchy sequence if for every $\varepsilon > 0$, there is an integer N such that

$$|s_n - s_m| < \varepsilon \quad \text{if} \quad m, n \geq N.$$

Theorem: If $\{s_n\}$ is a Cauchy sequence of real numbers, then $\{s_n\}$ is bounded.

Theorem:

- If $\{x_n\}$ is bounded, then $\{x_n\}$ has a convergent subsequence.

Select the correct option

- increasing subsequence.
- positive subsequence.
- convergent subsequence.
- decreasing subsequence.

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MC200405702: MISBAH NAZEER

MTH621:Quiz-1

Question # 7 of 10 (Start time: 10:40:28 AM, 04 June 2021)

$\limsup_{n\to\infty} s_n = \infty$ if

uenne

$$\limsup_{n\to\infty} s_n = \infty \text{ if } \{s_n\} \text{ is not bounded above,}$$
$$\limsup_{n\to\infty} s_n = -\infty \text{ if } \lim_{n\to\infty} s_n = -\infty,$$
$$\liminf_{n\to\infty} s_n = -\infty \text{ if } \{s_n\} \text{ is not bounded below,}$$
$$\liminf_{n\to\infty} s_n = \infty \text{ if } \lim_{n\to\infty} s_n = \infty.$$

Select the correct option

- $\{s_n\}$ has unique limit.
- $\{s_n\}$ has limit inferior.
- $\{s_n\}$ is convergent.
- $\{s_n\}$ is not bounded above.

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MC200405702: MISBAH NAZEER

MTH621:Quiz-1 Quiz Start Time:

Question # 8 of 10 (Start time: 10:41:35 AM, 04 June 2021)

Let $\sum_{n=k}^{\infty} a_n = A$ and $\sum_{n=k}^{\infty} b_n = B$, where A and B are finite.

Then $\sum_{n=k}^{\infty} (a_n + b_n) = - - - - - -$

Select the correct option

- $\frac{A}{B}$
- $A + B$
- AB
- $A - B$

Theorem: Let $\sum_{n=k}^{\infty} a_n = A$ and $\sum_{n=k}^{\infty} b_n = B$, where A and B are finite. Then

$$\sum_{n=k}^{\infty}(ca_n) = cA$$

if c is a constant,

$$\sum_{n=k}^{\infty}(a_n + b_n) = A + B,$$

and

$$\sum_{n=k}^{\infty}(a_n - b_n) = A - B.$$

Click to Save Answer & Mo

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MC200405702: MISBAH NAZEER

Time Left 88 sec(s)

MTH621:Quiz-1

Quiz Start Time: 10:36 AM, 04 June 2021

Question # 9 of 10 (Start time: 10:42:10 AM, 04 June 2021)

Total Marks: 1

Every sequence $\{s_n\}$ of real numbers has a unique limit superior, $\overline{s}$, and a unique limit inferior, $\underline{s}$, in the extended reals, and – – – –

Select the correct option

Reload Math Equations

- $\underline{s} \leqslant \overline{s}$
- $\underline{s} = \overline{s}$
- *None of these*
- $\underline{s} \geqslant \overline{s}$

Answer & Move to Next Question

Theorem: Every sequence $\{s_n\}$ of real numbers has a unique limit superior, $\overline{s}$, and a unique limit inferior, $\underline{s}$, in the extended reals, and

$$\underline{s} \leq \overline{s}.$$

Examples:

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Time Left 80 sec(s)

MTH621:Quiz-1

Quiz Start Time: 10:36 AM, 04 June 2021

Question # 10 of 10 (Start time: 10:43:04 AM, 04 June 2021)

Total Marks: 1

If $\{s_n\}$ is bounded above and does not diverge to $-\infty$, then there is a unique real number $\overline{s}$ such that
, if $\varepsilon > 0$, $s_n > \overline{s} - \varepsilon$ - - - - - -

Select the correct option

- *for \infinitely many n*
- *for finitely n*

Theorem:

- If $\{s_n\}$ is bounded above and does not diverge to $-\infty$, then there is a unique real number $\overline{s}$ such that, if $\varepsilon > 0$,

$$s_n < \overline{s} + \varepsilon \quad \text{for large } n \tag{2.4}$$

and

$$s_n > \overline{s} - \varepsilon \quad \text{for infinitely many } n. \tag{2.5}$$

Click to Save Answer & Move to Next Question

10:43

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Question # 1 of 10 (Start time: 10:44:13 AM, 04 June 2021)

The limit of the sequence

$$s_n = \frac{1}{n} + \frac{2(1+3/n)}{1+1/n}.$$

REPEAT

Select the correct option

- 2
- 3
- 4
- 1

10:44

- If $\{x_n\}$ is bounded, then $\{x_n\}$ has a convergent subsequence.
- If $\{x_n\}$ is unbounded above, then $\{x_n\}$ has a subsequence $\{x_{n_k}\}$ such that

$$\lim_{k\to\infty} x_{n_k} = \infty.$$

- If $\{x_n\}$ is unbounded below, then $\{x_n\}$ has a subsequence $\{x_{n_k}\}$ such that

$$\lim_{k\to\infty} x_{n_k} = -\infty.$$

Quiz Sta

rt time: 10:45:08 AM, 04 June 2021)

If $\{x_n\}$ *unbounded above, then* $\{x_n\}$ *has a subsequence* $\{x_n\}$ *such that* $\lim_{k\to\infty} x_{n_k} =$

n

0

1

∞

$-\infty$

Click to Save Ansv

10:46 401 B/s 70

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Question # 3 of 10 (Start time: 10:46:18 AM, 04 June 2021)

If $\{s_n\}$ converges to -1 and $\{t_n\}$ converges to 5, then the sequence $\{s_n + t_n\}$

Select the correct option

- may be convergent and may be divergent, it depends on the particular given sequenc
- will be convergent and its limit is 4.
- will be divergent.
- will be convergent and its limit is 5.

10:47

Quiz
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of 10 (Start time: 10:47:18 AM, 04 June 2021)

If a sequnce $\{s_n\}$ is nonincreasing, then – –

Recall the following theorem:

- If $\{s_n\}$ is nondecreasing, then $\lim_{n\to\infty} s_n = \sup\{s_n\}$.
- If $\{s_n\}$ is nonincreasing, then $\lim_{n\to\infty} s_n = \inf\{s_n\}$.

Theorem: If $a_n \geq 0$ for $n \geq k$, then $\sum a_n$ converges if its partial sums are bounde or diverges to ∞ if they are not. These are the only possibilities and, in either ca

∞

$lim_{n\to\infty} s_n = sup\{s_n\}$

$lim_{n\to\infty} s_n = \infty$

$lim_{n\to\infty} s_n = inf\{s_n\}$

10:48

24 K/s

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The value of the

$$\lim_{n\to\infty} \frac{1}{n^p}$$

is

Select the correct option

- $\lim_{n\to\infty} \frac{1}{n^p} = 1$ for all p.
- $\lim_{n\to\infty} \frac{1}{n^p} = 0$ for $p > 1$.
- $\lim_{n\to\infty} \frac{1}{n^p} = 1$ for $p > 1$.
- $\lim_{n\to\infty} \frac{1}{n^p} = 3$ for all p.

Theorem: If $p > 0$ and α is real, then

$$\lim_{n\to\infty} \frac{n^\alpha}{(1+p)^n} = 0.$$

Proof: Let k be an integer such that $k > \alpha$, $k > 0$.
For $n > 2k$,

$$(1+p)^n > \frac{n(n-1)\cdots(n-k+1)}{k!} p^k > \frac{n^k p^k}{2^k k!}.$$

Hence

$$0 < \frac{n^\alpha}{(1+p)^n} < \frac{2^k k!}{p^k} n^{\alpha-k}, \quad n > 2k.$$

Since $\alpha - k < 0, n^{\alpha-k} \to 0$ by

$$\lim_{n\to\infty} \frac{1}{n^p} = 0.$$

10:49

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MC190402195: MUHAMMAD ARSLAN

Time Left 87 sec(s)

MTH621:Quiz-1

Quiz Start Time: 10:44 AM, 04 June 2021

Question # 7 of 10 (Start time: 10:50:01 AM, 04 June 2021)

Total Marks: 1

Every Cauchy sequence has a

Select the correct option

repeat

- decreasing subsequence.
- convergent subsequence.
- increasing subsequence.
- positive subsequence.

Click to Save Answer & Move to Next Question

10:50

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The set of terms of $\{s_{n_k}\}$ is contained in the set of terms of $\{s_n\}$ implies

---

Since the set of terms of $\{s_{n_k}\}$ is contained in the set of terms of $\{s_n\}$,

$\sup\{s_n\} \geq \sup\{s_{n_k}\}$.

Select the correct option

- $\sup\{s_n\} \geqslant \sup\{s_{n_k}\}$.
- $\sup\{s_n\} = \sup\{s_{n_k}\}$.
- $\sup\{s_n\} \leqslant \sup\{s_{n_k}\}$.
- $\{s_n\}$ is convergent.

10:51

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MTH621:Quiz-1

Question # 9 of 10 (Start time: 10:51:36 AM, 04 June 2021)

If $f(x) = \sqrt{4 - x^2}$ and $g(x) = \sqrt{x - 1}$, then domain of the quotient function f/g is

repeat

Select the correct option

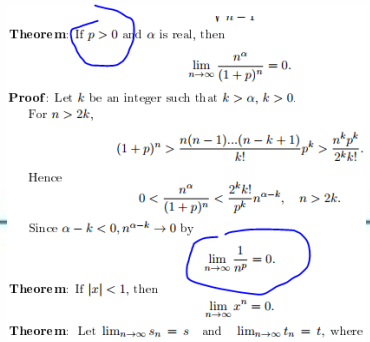
- $(1, 2]$.
- $[7, 8]$.
- $[1, 2]$.
- $[-3, 3]$.

10:52 78 B/s 68

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Question # 10 of 10 (Start time: 10:52:59 AM, 04 Jur

The value of the $\lim_{n\to\infty} \frac{1}{n^p}$ is



Theorem: If $p > 0$ and α is real, then

$$\lim_{n\to\infty} \frac{n^\alpha}{(1+p)^n} = 0.$$

Proof: Let k be an integer such that $k > \alpha$, $k > 0$.
For $n > 2k$,

$$(1+p)^n > \frac{n(n-1)\ldots(n-k+1)}{k!}p^k > \frac{n^k p^k}{2^k k!}.$$

Hence

$$0 < \frac{n^\alpha}{(1+p)^n} < \frac{2^k k!}{p^k} n^{\alpha-k}, \quad n > 2k.$$

Since $\alpha - k < 0, n^{\alpha-k} \to 0$ by

$$\lim_{n\to\infty} \frac{1}{n^p} = 0.$$

Theorem: If $|x| < 1$, then

$$\lim_{n\to\infty} x^n = 0.$$

Theorem: Let $\lim_{n\to\infty} s_n = s$ and $\lim_{n\to\infty} t_n = t$, where

Select the correct option

- $\lim_{n\to\infty} \frac{1}{n^p} = 3$ for all p.
- $\lim_{n\to\infty} \frac{1}{n^p} = 1$ for all p.
- $\lim_{n\to\infty} \frac{1}{n^p} = 1$ for all $p > 1$.
- $\lim_{n\to\infty} \frac{1}{n^p} = 0$ for $p > 0$.

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MC200405431: ABDUL REHMAN

Time Left

MTH621:Quiz-1

Quiz Start Time: 10:58 AM, 04 J

Question # 1 of 10 (Start time: 10:58:57 AM, 04 June 2021)

Total

If $\{s_n\}$ is bounded above and does not diverge to $-\infty$, then there is a unique real number $\overline{s}$ such that
, if $\varepsilon > 0$, $s_n < \overline{s} + \varepsilon$ - - - - -

Select the correct option

- *for small n*
- *for large n*

Theorem:

- If $\{s_n\}$ is bounded above and does not diverge to $-\infty$, then there is a unique real number $\overline{s}$ such that, if $\varepsilon > 0$,

$$s_n < \overline{s} + \varepsilon \quad \text{for large } n \tag{2.4}$$

and

Click to Save Answer & Move to Next Question

MC200405431: ABDUL REHMAN

MTH621:Quiz-1

Quiz Start Time: 10:5

Question # 2 of 10 (Start time: 10:59:30 AM, 04 June 2021)

$$If\ \{s_n\}\ is\ ------,\ then\ \lim_{n\to\infty} s_n = \sup\{s_n\}.$$

∞.

Recall the following theorem:

- If $\{s_n\}$ is nondecreasing, then $\lim_{n\to\infty} s_n = \sup\{s_n\}$.
- If $\{s_n\}$ is nonincreasing, then $\lim_{n\to\infty} s_n = \inf\{s_n\}$.

Theorem: If $a_n \geq 0$ for $n \geq k$, then $\sum a_n$ converges if its partial sums
or diverges to ∞ if they are not. These are the only possibilities and, i

$$\sum^{\infty}$$

Re

nondecreasing

nonincreasing

increasing

decreasing

Click to Save Answer & Move to N

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MC200405431: ABDUL REHMAN

MTH621:Quiz-1 Quiz Start

Question # 3 of 10 (Start time: 11:00:23 AM, 04 June 2021)

If $\{a_n\}_k^\infty$ is an infinite sequence of real numbers, the symbol – – – – – – – – isan infinite seriesandis

Select the correct option

- $\prod_k^\infty a_n$
- a_n
- $\sum_{n=k}^{\infty} a_n$
- None of these

Click to Save Answer

2.8 Series

If $\{a_n\}_k^\infty$ is an infinite sequence of real numbers, the symbol

$$\sum_{n=k}^{\infty} a_n$$

is an *infinite series*, and a_n is the *nth term* of the series.

We say that $\sum_{n=k}^{\infty} a_n$ *converges to the sum* A, and write

MC200405431: ABDUL REHMAN

Time Left 87 sec(s)

MTH621:Quiz-1

Quiz Start Time: 10:58 AM, 04 June 202

Question # 4 of 10 (Start time: 11:01:09 AM, 04 June 2021)

Total Marks:

If the sequence is convergent then

if the sequence is convergent then **it is bounded**

Select the correct option

- it is bounded above but may not be bounded below.
- it has two limits.
- it is bounded below but may not be bounded above.
- it is bounded.

Click to Save Answer & Move to Next Question

MTH621:Quiz-1

Question # 5 of 10 (Start time: 11:01:51 AM, 04 June 2021)

The series $\sum_{n=0}^{\infty} r^n, \quad -1 < r < 1$, is

Example: Consider the series

$$\sum_{n=0}^{\infty} r^n, \quad -1 < r < 1.$$

Here $a_n = r^n$ $(n \geq 0)$. The nth term of sequence of partial sum is

$$A_n = 1 + r + r^2 + \cdots + r^n = \frac{1 - r^{n+1}}{1 - r},$$

which converges to $1/(1-r)$ as $n \to \infty$. Thus, we write

$$\sum_{n=0}^{\infty} r^n = \frac{1}{1-r}, \quad -1 < r < 1.$$

Select the correct option

- convergent and converges to $\frac{1}{1-r}$.
- divergent.
- convergent and converges to $\frac{1}{1+r^2}$.
- convergent and converges to 5.

11:03 4G 80%
quiz.vu.edu.pk/QuizQuestio 3

Question # 7 of 10 (Start time: 11:03:36 AM, 04 June 2021)

A sequence $\{s_n\}$ of real numbers is called a $--------$ if for every $\varepsilon > 0$, there is an integer N such tha

2.7 Cauchy Sequence

A sequence $\{s_n\}$ of real numbers is called a Cauchy sequence if for every $\varepsilon > 0$, there is an integer N such that

$$|s_n - s_m| < \varepsilon \quad \text{if} \quad m, n \geq N.$$

Theorem: If $\{s_n\}$ is a Cauchy sequence of real numbers, then $\{s_n\}$ is bounded.

Proof: See Lecture

None of these

sequence

cauchy sequence

bounded sequence

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11:04 4G 8

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Question # 8 of 10 (Start time: 11:04:32 AM, 04 June 2021)

$\limsup_{n\to\infty} s_n = \infty$ if

$\limsup_{n\to\infty} s_n = \infty$ if $\{s_n\}$ is not bounded above,
$\limsup_{n\to\infty} s_n = -\infty$ if $\lim_{n\to\infty} s_n = -\infty$,
$\liminf_{n\to\infty} s_n = -\infty$ if $\{s_n\}$ is not bounded below,
$\liminf_{n\to\infty} s_n = \infty$ if $\lim_{n\to\infty} s_n = \infty$.

Every sequence $\{s_n\}$ of real numbers has a unique limit superior.

Select the correct option

- $\{s_n\}$ is not bounded above.
- $\{s_n\}$ has limit inferior.
- $\{s_n\}$ has unique limit.
- $\{s_n\}$ is convergent.

11:05 4G

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Question # 9 of 10 (Start time: 11:05:46 AM, 04

Which sequence is bounded.

Select the correct option

Example: If $s_n = [1+(-1)^n]n$, then $\{s_n\}$ is bounded below (s_n above.

$\{-s_n\}$ is bounded above ($-s_n \leq 0$) but unbounded below.

If $s_n = (-1)^n$, then $\{s_n\}$ is bounded.

If $s_n = (-1)^n n$, then $\{s_n\}$ is not bounded above or below.

Theorem: A convergent sequence is bounded.

Proof: By taking $\varepsilon = 1$, we see that if $\lim_{n\to\infty} s_n = s$, then t

- $\{(-1)^n\}$
- $\{n\}$
- $\{\frac{1}{n} + n^2\}$
- $1 + (-1)^n n$

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Question # 1 of 10 (Start time: 11:08:01 AM, 04 June 2021)

Which statement(s) is(are) true for the following sequence $\lim_{n\to\infty} \sqrt[n]{n}$

Theorem: Show that

$$\lim_{n\to\infty} \sqrt[n]{n} = 1.$$

Proof: Take $x_n = \sqrt[n]{n} - 1$.
Then $x_n \geq 0$, and, by the binomial theorem

$$n = (1 + x_n)^n \geq \frac{n(n-1)}{2} x_n^2.$$

Hence

$$0 \leq x_n \leq \sqrt{\frac{2}{n-1}}, \qquad n \geq 2.$$

Theorem: If $p > 0$ and α is real, then

$$\frac{n^\alpha}{}$$

Select the correct option

- The sequence converges to 0.
- The sequence is oscillatory.
- The sequence converges to 1.
- The sequence is divergent to

MTH621:Quiz-1 Quiz Start Time: 11

Question # 2 of 10 (Start time: 11:08:47 AM, 04 June 2021)

If $\{s_n\}$ is bounded above and does not diverge to $-\infty$, then there is a unique real number $\overline{s}$ such that
, if $\varepsilon > 0$, $s_n > \overline{s} - \varepsilon$ - - - - -

Select the correct option

for finitely n

- If $\{s_n\}$ is bounded above and does not diverge to $-\infty$, then there is a unique real number $\overline{s}$ such that, if $\varepsilon > 0$,

$$s_n < \overline{s} + \varepsilon \quad \text{for large } n \tag{2.4}$$

and

$$s_n > \overline{s} - \varepsilon \quad \text{for infinitely many } n. \tag{2.5}$$

for \infinitely many n

Click to Save Answer & Move t

Quiz Start Time: 11:08 AM,

: 11:10:22 AM, 04 June 2021)

A divergent infinite series that does not diverge to $\pm\infty$ *is said to be* $-----$.

2.8.2 Oscillatory Series

A divergent infinite series that does not diverge to $\pm\infty$ is said to *oscillate*, or *be oscillatory*.

Example: Consider the series

$$\sum_{n=1}^{\infty}$$

oscillate

convergent

None of these

bounded

Click to Save Answer & Move to Next Q

Question # 5 of 10 (Start time: 11:11:14 AM, 04 June 2021)

$\limsup_{n\to\infty} s_n = \infty$ if

Select the correct option

repeat

- $\{s_n\}$ is convergent.
- $\{s_n\}$ has limit inferior.
- $\{s_n\}$ is not bounded above.

c

- $\{s_n\}$ has unique limit.

stion # 7 of 10 (Start time: 11:12:44 AM, 04 June 2021)

r the convergent sequence

$\{s_n$

nich statement is true?

Theorem
If $\{S_n\}$ is a convergent sequence then
$\lim S_n = \lim(\inf S_n) = \lim(\sup S_n)$

ct the correct option

- $\limsup_{n\to\infty} s_n = \liminf_{n\to\infty} s_n = \lim_{n\to\infty} s_n.$
- $\limsup_{n\to\infty} s_n \neq \liminf_{n\to\infty} s_n = \lim_{n\to\infty} s_n.$
- $\limsup_{n\to\infty} s_n \neq \liminf_{n\to\infty} s_n \neq \lim_{n\to\infty} s_n.$
- has a divergent subsequence.

estion # 8 of 10 (Start time: 11:13:23 AM, 04 June 2021)

$\{s_n\}$ converges to -1 and $\{t_n\}$ converges to 5, then the sequence $\{s_n + t_n\}$

ect the correct option

repeat

- will be convergent and its limit is 5.
- will be convergent and its limit is 4.
- will be divergent.
- may be convergent and may be divergent, it depends on the particular given sequences $\{s_n\}$

MTH621:Quiz-1

Question # 9 of 10 (Start time: 11:14:06 AM, 04 June 2021)

$For \ ------series \ \sum_{n=1}^{\infty} \frac{1}{n} = 0.$

Not sufficient.

Example: For the harmonic series $\lim_{n\to\infty} \frac{1}{n} = 0$.

But we have proved that

$$\sum_{n=1}^{\infty} \frac{1}{n}$$

is divergent.

Corollary: If $\sum a_n$ converges, then for each $\varepsilon > 0$ there is an in

Select the correct option

- arithmetic
- geometric
- None of these
- harmonic

series

$$\sum_{n=0}^{\infty} r^n, \quad -1 < r < 1,$$

repeat

t the correct option

- divergent.
- convergent and converges to $\frac{1}{1-r}$.
- convergent and converges to 5.
- convergent and converges to $\frac{1}{1+r^2}$.

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A divergent infinite series that does not diverge to $\pm\infty$ is said to be - - - - -.

correct option

None of these

b *oscillate*

convergent

bounded

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MTH621:Quiz-1

Quiz Start Time: 12:12 PM, 04 June 2021

Question # 7 of 10 (Start time: 12:31:26 PM, 04 June 2021)

Total Marks: 1

A divergent infinite series that does not diverge to ---------- is said to be oscillate

repeat

Select the correct option

Reload Math Equations

- ± 1
- $\pm \infty$
- ± 2
- None of these

Click to Save Answer & Move to Next Question

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If a sequnce $\{s_n\}$ is nonincreasing, then - - - - -

e correct option

$lim_{n\to\infty} s_n = \infty$

$lim_{n\to\infty} s_n = sup\{s_n\}$

$lim_{n\to\infty} s_n = inf\{s_n\}$

repeat

None of these

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Time

Quiz Start Time: 12:12 P

0 (Start time: 12:33:35 PM, 04 June 2021)

If $\{x_n\}$ *unbounded below, then* $\{x_n\}$ *has a subsequence* $\{x_n\}$ *such that* $\lim_{k\to\infty} x_{n_k} =$ - - - -

$\lim_{k\to\infty} x_{n_k} = \infty.$

- If $\{x_n\}$ is unbounded below, then $\{x_n\}$ has a subsequence $\{x_{n_k}\}$ such that $\lim_{k\to\infty} x_{n_k} = -\infty.$

ct optior

Reloc

$-\infty$

0

1

∞

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MTH621:Quiz-1

Question # 10 of 10 (Start time: 12:34:26 PM, 04 June 2021)

The value of the $\lim_{n\to\infty} \frac{1}{n^p}$ is

repeat

Select the correct option

- $\lim_{n\to\infty} \frac{1}{n^p} = 0$ for $p > 0$.
- $\lim_{n\to\infty} \frac{1}{n^p} = 1$ for all p.
- $\lim_{n\to\infty} \frac{1}{n^p} = 3$ for all p.
- $\lim_{n\to\infty} \frac{1}{n^p} = 1$ for all $p > 1$.

MC200401417: QAFIA HAIDER

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MTH621:Quiz-1

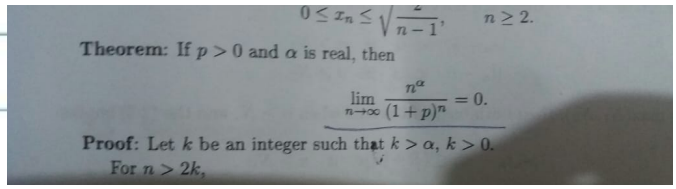
Quiz Start Time: 12:58 PM, 0

Question # 1 of 10 (Start time: 12:58:39 PM, 04 June 2021)

If $p > 0$ and α is real, then value of the

$$\lim_{n\to\infty} \frac{n^\alpha}{(1+p)^n},$$

is



Select the correct option

- ∞.
- 0.
- 2.
- 3.

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MTH621:Quiz-1

Quiz Start Time: 12:58 PM, 04

Question # 2 of 10 (Start time: 12:59:26 PM, 04 June 2021)

To

$If \sum a_n$ – – – – –, *then*

Now Theorem implies that $\sum$ converges if $|r| < 1$, as in Exam

Corollary: If $\sum a_n$ converges, then $\lim_{n\to\infty} a_n = 0$

Proof: If $\sum a_n$ converges, then for each $\varepsilon > 0$ there is an int

$$\left|\sum_{n=k}^{\infty} a_n\right| < \varepsilon \quad \text{if} \quad k \geq K;$$

that is

Select the correct option

Reload Mat

- None of these
- $\lim_{n\to\infty} a_n = -1$
- $\lim_{n\to\infty} a_n = 0$
- $\lim_{n\to\infty} a_n = 1$

Click to Save Answer & Move to Next Ques

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Time Left 87 sec(s)

MTH621:Quiz-1

Quiz Start Time: 12:58 PM, 04 June 2021

Question # 3 of 10 (Start time: 01:00:12 PM, 04 June 2021)

Total Marks: 1

If the sequence is convergent then

repeat

Select the correct option

- it is bounded.
- it is bounded below but may not be bounded above.
- it is bounded above but may not be bounded below.
- it has two limits.

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Time Left 86 sec(s)

MTH621:Quiz-1

Quiz Start Time: 12:58 PM, 04 June 202

Question # 4 of 10 (Start time: 01:00:41 PM, 04 June 2021)

Total Marks:

$If\ \{s_n\}\ is\ a\ sequence\ of\ real\ numbers,\ then\ \lim_{n\to\infty} s_n = s\ iff\ \lim_{n\to\infty} \sup s_n - - - - \lim_{n\to\infty} \inf s_n = s.$

Theorem: If $\{s_n\}$ is a sequence of real numbers, then

$$\lim_{n\to\infty} s_n = s$$

if and only if

$$\limsup_{n\to\infty} s_n = \liminf_{n\to\infty} s_n = s.$$

Select the correct option

- $=$
- *None of these*
- $<$
- $>$

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MTH621:Quiz-1

Quiz Start Time: 12:58 PM, 04 June 2021

Question # 5 of 10 (Start time: 01:01:19 PM, 04 June 2021)

Total Marks: 1

$If\ \{s_n\}\ is\ bounded\ above\ and\ does\ not\ diverge\ to\ -\infty,\ then\ there\ is\ a\ unique\ real\ number\ \bar{s}\ such\ that$
$,if\ \varepsilon > 0,\ s_n > \bar{s} - \varepsilon\ - - - - -$

Select the correct option

Reload Math Equations

repeat

- $for\ \backslash infinitely\ many\ n$
- $for\ finitely\ n$

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Time Left 86 sec(s)

MTH621:Quiz-1

Quiz Start Time: 12:58 PM, 04 June 2021

Question # 6 of 10 (Start time: 01:02:12 PM, 04 June 2021)

Total Marks: 1

$If\ \{x_n\}\ unbounded\ above,\ then\ \{x_n\}\ has\ a\ subsequence\ \{x_n\}\ such\ that\ \lim_{k\to\infty} x_{n_k} = ----$

repeat

Select the correct option

Reload Math Equations

- $-\infty$
- ∞
- 1
- 0

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MTH621:Quiz-1

Question # 7 of 10 (Start time: 01:02:48 PM, 04 June 2021)

Which statement(s) is(are) true for the following sequence $\{\sqrt[n]{n}\}$

repeat

Select the correct option

- The sequence is convergent and converges to 1.
- The sequence is divergent.
- The sequence is convergent and converges to 0.
- The sequence is divergent to ∞.

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MTH621:Quiz-1

Quiz Start Time: 12:58 PM, 0

Question # 8 of 10 (Start time: 01:03:29 PM, 04 June 2021)

T

$If\ \{x_n\}\ unbounded\ below,\ then\ \{x_n\}\ has\ a\ subsequence\ \{x_n\}\ such\ that\ \lim_{k\to\infty} x_{n_k} = ----$

Select the correct option

repeat

Reload Ma

- ∞
- $-\infty$
- 1
- 0

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MTH621:Quiz-1

Question # 9 of 10 (Start time: 01:04:03 PM, 04 June 2021)

The given series $\sum_{n=1}^{\infty} \frac{1}{n}$ *is* $-----$.

Select the correct option

- divergent
- convergent

Theorem: Show that the series $\sum_{n=1}^{\infty} \frac{1}{n}$ is divergent.

Proof: Consider the sequence of partial sums

$$s_1 = 1, s_2 = 1 + \frac{1}{2}, s_3 = 1 + \frac{1}{2} + \frac{1}{3}, s_4 1 + \frac{1}{2} +$$

form strictly increasing sequence

Click t

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MTH621:Quiz-1 Quiz Start Time:

Question # 10 of 10 (Start time: 01:04:36 PM, 04 June 2021)

The value of the $\lim_{n\to\infty} \frac{1}{n^p}$ is

Select the correct option

repeat

- $\lim_{n\to\infty} \frac{1}{n^p} = 1$ for all p.
- $\lim_{n\to\infty} \frac{1}{n^p} = 0$ for $p > 0$.
- $\lim_{n\to\infty} \frac{1}{n^p} = 3$ for all p.
- $\lim_{n\to\infty} \frac{1}{n^p} = 1$ for all $p > 1$.

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