

MTH 621. Grand Quiz

Date: 06 July 2020

Solved By

M.Waseem Sajjad Gill

M.Sc Mathematics

**From Nice Institute of Computer
Science**

Virtual University Haroonabad

Session: 2017-2019

E.mail:waseemsajjadgill@gmail.com

Phone: 0324 7178198

Question # 15 of 30 (Start time: 05:45:48 AM, 06 July 2020)

Total Marks: 1

The set $S = \{x : 0 < |x - x_0| < \epsilon\}$ is called - - - - -

Select the correct option

[Reload Math Equations](#)*Deleted neighborhood of x* *Deleted neighborhood of x_0* *Exterior containing x_0* *None of these*

Which one is true for the two sets given by $S = \{x \in \mathbb{R} : 0 < x < 1\}$ and $T = \{x \in (0,1) : x \text{ is rational}\}$?

Select the correct option

 Reload Math Equations



$$S \cap T = T$$



$$S \cap T = T$$



$$S \cap T = S$$



None of these

The series

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

Select the correct option

[Reload Math Equations](#)

divergent.

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

convergent and converges to 5.

convergent and converges to $\frac{1}{1-r}$.

The following series

$$\sum_{n=2}^{\infty} \frac{\sin n\theta}{n + (-1)^n}, \quad \theta \neq k\pi \ (k = \text{integer}),$$

Select the correct option

[Reload Math Equations](#)

divergent.



convergent by Ratio test.



is convergent by Dirichlet's test.



None of the above.

Suppose that $a_n \geq 0$ and $b_n > 0$ for $n \geq k$. Then $\sum a_n < \infty$ if $\sum b_n < \infty$ and $\limsup_{n \rightarrow \infty} \frac{a_n}{b_n} \dots$.

Select the correct option

 Reload Math Equations

☒	$< \infty$
☐	$> \infty$
☐	$= 0$
☐	None of these

The proposition P_n represented by $1 + 2 + 3 \dots + n$ is equal to

Select the correct option

 Reload Math Equations



$$n(n+1)/2$$



$$n(n+1)/3$$



$$(n+1)(n+2)/2$$



$$n(n+1)/4$$

An initial segment A of N is a nonempty subset of N with the property that

Select the correct option

 Reload Math Equations



$$n \in A, m \geq n \text{ then } m \in A$$



$$n \in A, m \leq n \text{ then } m \in A$$



$$n \in A, m \geq n \text{ then } m \in N$$



None of these

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

Select the correct option

 Reload Math Equations



converges



diverges

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 is the n^{th} term of series.

Select the correct option

 Reload Math Equations



$$\prod_k^\infty a_n$$



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



$$a_n$$



None of these

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

Select the correct option

 Reload Math Equations



$>$



$<$



$=$



None of these

Click to Save Answer & Move to Next Question

If $|x| < 1$, then

Select the correct option

 Reload Math Equations



$$\lim_{n \rightarrow \infty} x^n = 0$$



$$\lim_{n \rightarrow \infty} x^n = 1$$



$$\lim_{n \rightarrow \infty} x^n = -1$$



None of these

If $s_n = (2n + 1) / (n + 1)$, then $\lim_{n \rightarrow \infty} s_n = \text{--- --}$

Select the correct option

 Reload Math Equations



3



2



4



None of these

Question # 27 of 30 (Start time: 09:52:29 AM, 06 July 2020)

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

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

Select the correct option



∞ .



3.



2.



0.

For a set $N \times N$, then which of the following statement is true for this set?

Select the correct option

Reload Ma

$N \times N$ is countable

$N \times N$ is not countable

$N \times N$ is finite

Question # 4 of 30 (Start time: 08:02:11 AM, 06 July 2020)

Total Marks: 1

For any two sets S and T , the set $S - T$ is the set of elements that are

Select the correct option

[Reload Math Equations](#)

in S but not in T



in both S and T



in T but not in S

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

Select the correct option



∞



1



0

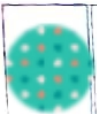


$-\infty$

If $|s_n| \leq r$ for any sequence $\{s_n\}$, where r is a real number, then $\{s_n\}$ is - - - - -

Select the correct option

 Reload



Bounded



Bounded above



Bounded sequence

If $\{s_n\}$ is a cauchy sequence of real numbers, then $\{s_n\}$ is -----.

Select the correct option

 Reload Math Equations

bounded

unbounded



Suppose that $a_n \geq 0$ and $b_n > 0$ for $n \geq k$. Then $\sum a_n < \infty$ if $\sum b_n < \infty$ and

Select the correct option

☐ $\lim_{n \rightarrow \infty} \sup \frac{a_n}{b_n} = \infty$

☐ $\lim_{n \rightarrow \infty} \sup \frac{a_n}{b_n} > \infty$

 $\lim_{n \rightarrow \infty} \sup \frac{a_n}{b_n} < \infty$

If $s_n > a$ for any sequence $\{s_n\}$, where a is a real number, then $\{s_n\}$ is said to be — — — — sequence.

Select the correct option

 Reload Math Equations



Convergent



Divergent

Absolutely convergent

Question # 11 of 30 (Start time: 05:41:09 AM, 06 July 2020)

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

Select the correct option



will be divergent.



will be convergent and its limit is 5 .



will be convergent and its limit is 4 .



may be convergent and may be divergent, it depends on the particular given sequences $\{s_n\}$ and $\{t_n\}$.

Which statement(s) is(are) true

Select the correct option



The set of even numbers is defined as $\{2k - 1 : k \in \mathbb{N}\}$.



The set of odd numbers is defined as $\{2k : k \in \mathbb{N}\}$.



Both set of even numbers and set of odd numbers are countable.



The set of even numbers is a finite set.

The series $\sum \frac{1}{n^p}$ diverges if ---.

Select the correct option

☐	$p \geq 1.$
☒	$p \leq 1.$
☐	$p > 1.$
☐	None of these

The supremum of the set $B = \{p \in \mathbb{Q} : p^2 < 3\}$ is

Select the correct option



$\sqrt{2}.$



$\sqrt{3}.$



$10.$



$19.$

Question # 26 of 30 (Start time: 05:57:58 AM, 06 July 2020)

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

Select the correct option



$c + A$



$c - A$



$\frac{c}{A}$



cA

Identify the identical sequences.

Select the correct option



$$\left\{ \frac{1}{n^2 - 2} \right\}_3^{\infty} \text{ and } \left\{ \frac{1}{n} \right\}_1^{\infty}.$$



$$\left\{ \frac{1}{n} \right\}_3^{\infty} \text{ and } \left\{ \frac{1}{n} \right\}_1^{\infty}.$$



$$\left\{ \frac{1}{n - 2} \right\}_3^{\infty} \text{ and } \left\{ \frac{1}{n^2} \right\}_1^{\infty}.$$



$$\left\{ \frac{1}{n - 2} \right\}_3^{\infty} \text{ and } \left\{ \frac{1}{n} \right\}_1^{\infty}.$$

The number e is defined by the infinite series and denoted by —

Select the correct option

	$\sum_{n=0}^{\infty} \frac{1}{n}$
	$\sum_{n=0}^{\infty} n$
	$\sum_{n=0}^{\infty} n^2$
	$\sum_{n=0}^{\infty} \frac{1}{n!}$

Suppose $a_1 \geq a_2 \geq \dots \geq 0$. Then the series $\sum_{n=1}^{\infty} a_n$ converges iff the series $\sum_{k=0}^{\infty} 2^k a_{2^k}$ — — .

Select the correct option

converges



diverges



The statement(s) true about the real number $4\sqrt{10}$ is(are)

Select the correct option

☐	is a rational number.
☒	an irrational number.
☐	the solution of $x^2 - 2x + 3$.
☐	the solution of $x^2 - 4 = 0$.

For any two reals a and b , $|a - b| \geq$.

Select the correct option



$$||a| + |b||$$



$$||a| - |b||$$



$$|a| + |b|$$



None of these

Suppose that

$$0 \leq a_n \leq b_n, \quad n \geq k.$$

Then

Select the correct option



$$\sum a_n < \infty.$$



$$\sum a_n < \infty \text{ if } \sum b_n < \infty.$$



$$\sum a_n = c \text{ if } \sum b_n = c.$$



$$\sum a_n < \infty \text{ if } \sum b_n = 0$$

If $\{s_n\}$ is — — — —, then $\lim_{n \rightarrow \infty} s_n = \sup \{s_n\}$.

Select the correct option



increasing



decreasing



nonincreasing



nondecreasing

(In Comparison test) Suppose that $a_n \geq b_n$, $n \geq k$. Then $\sum a_n < \infty$, if $\sum b_n < \infty$.

Select the correct option

☐ $0 \geq a_n \geq b_n$

☒ $0 \leq a_n \leq b_n$

☐ $0 = a_n = b_n$

☐ None of these

A set D is said to be dense in the set of real numbers if

Select the correct option

	<i>every open interval contains a member of D</i>
	<i>every closed interval contains a member of D</i>
	<i>every open interval contains infinite members of D</i>

For a mapping from N to N defined by $f(n) = 2n, n \in N$, then

Select the correct option



f is not injective but surjective



f is both injective and surjective

f is injective and not surjective

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

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

Select the correct option

☒ $A + B$

☐ $A - B$

☐ $\frac{A}{B}$

For the convergent sequence

$$\{s_n\},$$

which statement is true?

Select the correct option



has a divergent subsequence.



$$\limsup_{n \rightarrow \infty} s_n = \liminf_{n \rightarrow \infty} s_n = \lim_{n \rightarrow \infty} s_n.$$



$$\limsup_{n \rightarrow \infty} s_n \neq \liminf_{n \rightarrow \infty} s_n \neq \lim_{n \rightarrow \infty} s_n.$$



$$\limsup_{n \rightarrow \infty} s_n \neq \liminf_{n \rightarrow \infty} s_n = \lim_{n \rightarrow \infty} s_n.$$

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

Select the correct option

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

The supremum of the set $E_2 = \{1/n : n \in \mathbb{N}\}$ is

Select the correct option

☐	5
☒	1
☐	7
☐	4

The union of set of rational numbers and the set of irrational numbers is

Select the correct option



The set $\{n \in \mathbb{Q} : x^7 - 10x + 30 = 0\}$.



The set of integers.



The set of natural numbers.

☐ $\mathbb{R}$, the set of real numbers.

Identify the true statement about the number e

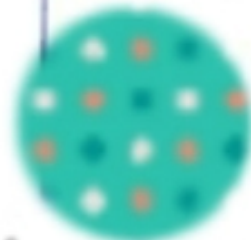
Select the correct option



$$\lim_{n \rightarrow \infty} \left(1 + n\right)^n = e.$$



$$\lim_{n \rightarrow 1} \left(1 + \frac{1}{n}\right)^n = e.$$



e is a rational number.

Identify the countable set

Select the correct option



The set of irrational numbers.



The interval $[0, 1]$.



$\mathbb{N} \times \mathbb{N}$.



The interval $[1, 2]$.

The series $\sum^{\infty} \frac{1}{(n^2+n)^q}$

Select the correct option



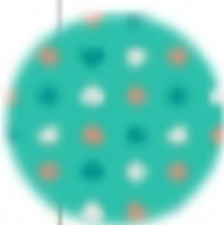
converges if $q > 2$.



converges if $q > 1/4$.



converges if $q < 1/2$.



converges if $q > 1/2$.

Suppose that $a_n > 0$, $b_n > 0$ and $---$. Then $\sum b_n = \infty$ if $\sum a_n = \infty$.

Select the correct option



$$\frac{a_{n+1}}{a_n} = \frac{b_{n+1}}{b_n}$$


$$\frac{a_{n+1}}{a_n} \geq \frac{b_{n+1}}{b_n}$$



$$\frac{a_{n+1}}{a_n} \leq \frac{b_{n+1}}{b_n}$$



None of these

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

Select the correct option



$[7, 8]$.



$[-3, 3]$.



$[1, 2]$.



$(1, 2]$.

The set $A = \{x \in \mathbb{N} : x^2 - 2x + 1 = 0\}$ is equal to

Select the correct option



$\{0\}$.



$\{1, 2\}$.

☒

$\{1\}$.

If $p > 1$, the given series $\sum_{n=2}^{\infty} \frac{1}{n(\log n)^p}$, is - - - -

Select the correct option



converges



diverges

Which one is an irrational number

Select the correct option

☐	$\frac{22}{7}$
☒	π
☐	$\frac{p+q}{pq}$, where p, q are nonnegative integers.

An upper bound for the set $A = \{p \in \mathbb{Q} : p^2 < 2\}$ is

Select the correct option



-1.



0.

4.