MTH641 Functional Analysis

Question No : 7 of 41 **Marks: 1 (Budgeted 1**

If $S = \{v_1, v_2, v_3, \ldots, v_n\}$ is a set of vectors in a finite dimensional vector space X, then S is called a basis for V if ---------- and S is linearly independent.

Answer (Please select your correct option)

- S does not span V
- S is linearly dependent
- S is set of scalars
- S spans V

MTH641 Functional Analysis

Question No : 11 of 41

Let T be a bounded linear operator. Then $x_n \to x$ (where $x_n, x \in D(T)$) implies _____

Answer (Please select your correct option)

- $x_n \to x$
- $Tx_n \to Tx$
- $Tx \to Tx_n$
- None of these

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Question No : 25 of 41

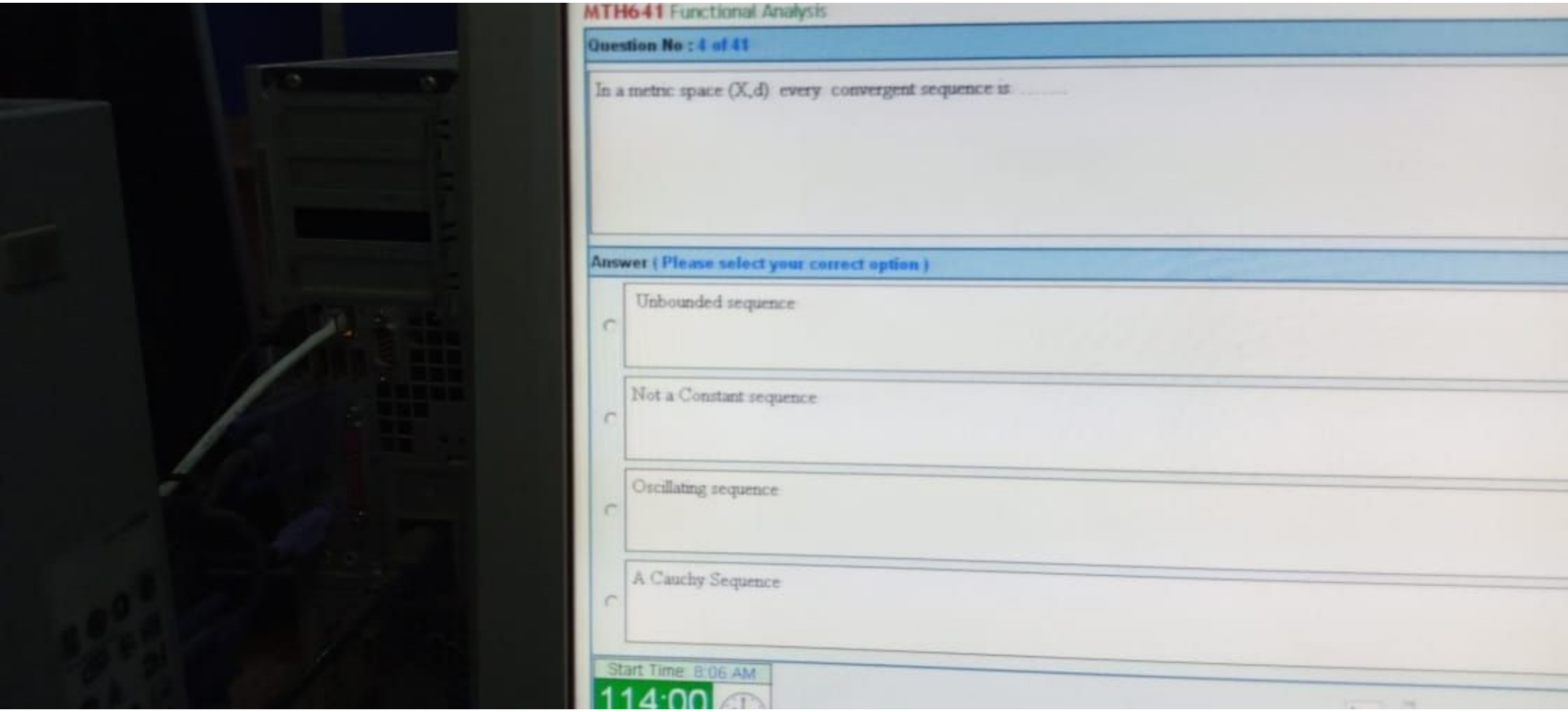
Isomorphism of an inner product space onto an inner product space over the same field is a ..... linear operator that preserves inner product.

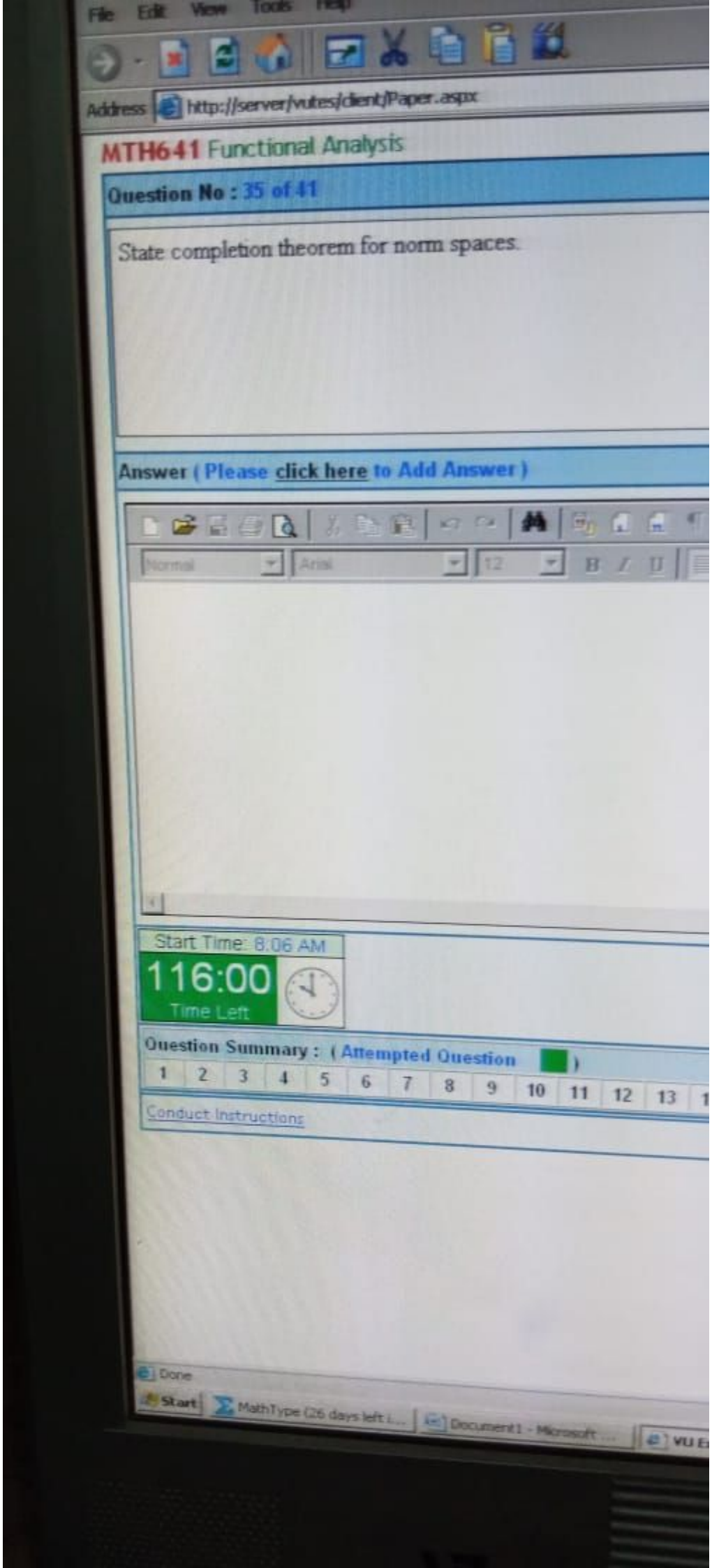
Answer (Please select your correct option)

- Bijective
- Injective
- Surjective
- None of these

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MTH641 Functional Analysis
Question No : 4 of 41
In a metric space (X,d) every convergent sequence is .....
Answer (Please select your correct option)
Unbounded sequence
Not a Constant sequence
Oscillating sequence
A Cauchy Sequence
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MTH641 Functional Analysis
Question No : 35 of 41
State completion theorem for norm spaces.
Answer (Please click here to Add Answer)
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Question Summary : (Attempted Question)
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MTH641 Functional Analysis

Question No : 27 of 41

For subsets A and B of an inner product space X, A is orthogonal to B if .....

Answer (Please select your correct option)

- a is orthogonal to b for all $a \in A and b \in B$
- a is orthogonal to b for a fixed $a \in A and\ a\ fixed\ b \in B$
- a is orthogonal to b for a fixed $a \in A and\ b \in B$
- a is orthogonal to b for all $a \in A and\ a\ fixed\ b \in B$

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MTH641 Functional Analysis

Question No : 32 of 41

Define extension of operator T.

Answer (Please click here to Add Answ

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MTH641 Functional Analysis

Question No : 21 of 41

Every complete normed space is _____ space.

Answer (Please select your correct option)

- Hilbert
- Banach
- Unitary
- Euclidean

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Question Summary : (Attempted Question)

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

Conduct Instructions

Question No : 9 of 41

If a normed space X is finite dimensional, then every linear operator on X is_____.

Answer (Please select your correct option)

- finite
- unbounded
- bounded
- none of these

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MTH641 Functional Analysis

Marks: 1 (Budgeted Tim

Question No : 7 of 41

If $S = \{v_1, v_2, v_3, \ldots, v_n\}$ is a set of vectors in a finite dimensional vector space X, then S is called a basis for V if ---------- and S is linearly independent.

Answer (Please select your correct option)

- S does not span V
- S is linearly dependent
- S is set of scalars
- S spans V

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MTH641 Functional Analysis MC1

Question No : 39 of 41 Marks: 5 (Budgeted Time Min)

Let $T : D(T) \to Y$ be a bounded linear operator, where $D(T)$ lies in a normed space X and Y is a Banach space. Then T ha an extension $\tilde{T} : \overline{D(T)} \to Y$ where $\tilde{T}$ is a bounded linear operator of norm , then show that

$\|\tilde{T}\| = \|T\|$

Answer (Please click here to Add Answer)

100%

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MTH641 Functional Analysis

Question No : 16 of 41

Which of the following is a condition of an inner product space?

Answer (Please select your correct option)

- $\langle \alpha x, y \rangle = \alpha \langle x, y \rangle$
- $\langle \alpha x + y, z \rangle = \langle x, z \rangle + \alpha \langle y, z \rangle$
- $\langle \alpha x, y \rangle = \langle x, \alpha y \rangle$
- $\langle x, y \rangle = \overline{\langle x, y \rangle}$

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Question Summary : (Attempted Question)

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MTH641 Functional Analysis

Question No : 1 of 41

If d is a metric on X, Then for all x, y ∈ X, d(x,y) is....

Answer (Please select your correct option)

- A non negative real number
- A negative real number
- Not a rational number
- A complex number

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Question Summary : (Attempted Question)

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Conduct Instructions

Question No : 5 of 41

A sequence (x_n) in a metric space is said to be non-decreasing if for all n,

Answer (Please select your correct option)

- $x_n \geq x_{n+1}$
- $x_n \leq x_{n+1}$
- $x_n < x_{n+1}$
- $x_n > x_{n+1}$

Question No : 3 of 41

For any non empty subset A of (X,d), the diameter $\delta(A)$ of A is defined as .....

Answer (Please select your correct option)

- $\delta(A) = \underset{x,y \in A}{Inf}\, d(x,y)$
- $\delta(A) = \underset{x,y \in A}{d(x,y)}$
- $\delta(A) = \underset{x,y \in A}{Sup}\, d(x,y)$
- $\delta(A) = \underset{x,y \in A}{d(x,y)}$

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MTH641 Functional Analysis

Question No : 26 of 41 Marks: 1 (Budgeted

For a subset A of an inner product space X, x is orthogonal to A if .....

Answer (Please select your correct option)

- x is orthogonal to a for all $a \in A$
- x is orthogonal to any two elements a and b $\in A$
- x is orthogonal to a for a fixed $a \in A$
- None of these

Question No : 8 of 41

If a normed space X is _____ dimensional, then every linear operator on X is bounded.

Answer (Please select your correct option)

- infinite
- finite

Question No : 18 of 41

In an inner product space V, the function $\|\ .\ \| : V \to R^+$ given by _____ defines a _____ in V.

Answer (Please select your correct option)

- $|x| = \sqrt{\langle x, y \rangle}$, $x, y \in V$, norm
- $|x| = \sqrt{\langle x, x \rangle}$, $x \in V$, norm
- $|x| = \sqrt{\langle x, x \rangle}$, $x \in V$, metric
- None of these

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MTH641 Functional Analysis

Question No : 17 of 41

Which of the following is a condition of an inner product space?

Answer (Please select your correct option)

- $\langle x,y\rangle = \overline{\langle x,y\rangle}$
- $\langle ax,y\rangle = \langle x,ay\rangle$
- $\langle ax+y,z\rangle = \langle x,z\rangle + a\langle y,z\rangle$
- $\langle x,y\rangle = \overline{\langle y,x\rangle}$

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Question Summary : (Attempted Question)

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MTH641 Functional Analysis

Question No : 36 of 41 Marks:

Let X be a finite dimensional vector space. If $x_0 \in X$ has the property that $f(x_0) = 0$ for all $f \in X^*$, then $x_0 = 0$.

Answer (Please click here to Add Answer)

100%

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MTH641 Functional Analysis

Marks: 1 (B

Question No : 14 of 41

The dual space of a normed space X contains all ..... on X.

Answer (Please select your correct option)

- Bounded linear functional
- Unbounded linear functional
- Bounded linear operator
- Unbounded linear operator

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MTH641 Functional Analysis

Question No : 37 of 41

Show that every inner product space is a metric space.

Answer (Please click here to Add Answer)

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Question Summary : (Attempted Question)

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ATH641 Functional Analysis

Question No : 19 of 41

Which of the following is true about the inner product space?

Answer (Please select your correct option)

- Every normed space is an inner product space.
- Every inner product space is a normed space.
- Every inner product space is Hilbert space.
- None of these is true.

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Question Summary : (Attempted Question)

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MTH641 Functional Analysis MC180

Question No : 41 of 41 Marks: 5 (Budgeted Time Min)

Let H_1 and H_2 be Hilbert spaces, $S: H_1 \to H_2$ and $T: H_1 \to H_2$ be bounded linear operator and α any scalar. Then show that $T^{\wedge}T = 0 \Leftrightarrow T = 0$.

Answer (Please click here to Add Answer)

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MTH641 Functional Analysis

Question No : 38 of 41 Marks:

Let the operators $U : H \to H$ and $V : H \to H$ be unitary, here, H is a Hilbert space. Then show that $\|V\| = 1$, provided $H \neq \{0\}$

Answer (Please click here to Add Answer)

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MTH641 Functional Analysis

Question No : 22 of 41

Which of the following is an example of an inner product space.

Answer (Please select your correct option)

- $\{a,b\}$
- $[a,b]$
- Space R^n
- None of these

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Question Summary : (Attempted Question)

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MTH641 Functional Analysis

Question No : 20 of 41

Every complete inner product space is _____ space.

Answer (Please select your correct option)

- Hilbert
- Banach
- Unitary
- Euclidean

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Question Summary : (Attempted Question)

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Done

Question No : 12 of 41 Marks: 1 (Budgeted Time Min)

Two operators T_1 *and* T_2 are defined to be equal, written $T_1 = T_2$, if _____ and if $T_1x = T_2x$ for all_____.

Answer (Please select your correct option)

- $D(T_1) = D(T_2), \quad x \in D(T_1) = D(T_2)$
- $D(T_1) \subset D(T_2), \quad x \in D(T_1) = D(T_2)$
- $D(T_1) \supseteq D(T_2), \quad x \in D(T_1) = D(T_2)$
- $D(T_1) \supset D(T_2), \quad x \in D(T_1) = D(T_2)$

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MTH641 Functional Analysis

Question No : 10 of 41

Let $T : D(T) \to Y$ be a linear operator, where $D(T) \subseteq X$ and X, Y are normed spaces, then T is continuous if and only if T is _____

Answer (Please select your correct option)

- continuous
- linear
- bounded
- none of these

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Question No : 29 of 41

Any pair of vectors in an orthogonal system is ..... to each other

Answer (Please select your correct option)

- Parallel
- Equal
- None of these
- Perpendicular

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MTH641 Functional Analysis

Question No : 31 of 41

State continuous mapping theorem.

Answer (Please **click here** to Add Answer)

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MTH641 Functional Analysis

Question No : 24 of 41

Which of the following is not true for the space l^p *with* $p \neq 2$?

Answer (Please select your correct option)

- It is a complete metric space
- It is a complete norm space
- It is a complete inner product space
- None of these

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Question Summary : (Attempted Question)

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MTH641 Functional Analysis

Question No : 28 of 41

Inner product is the generalization of .....

Answer (Please select your correct option)

- Cross product
- Dot product
- Multiplication
- Distance function

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Question Summary : (Attempted Question)

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MTH641 Functional Analysis

Question No : 23 of 41

Parallelogram equality is .....

Answer (Please select your correct option)

- $\|x+y\|^2 - \|x-y\|^2 = 2(\|x\|^2 - \|y\|^2)$
- $\|x+y\|^2 - \|x-y\|^2 = 2(\|x\|^2 + \|y\|^2)$
- $\|x+y\|^2 + \|x-y\|^2 = 2(\|x\|^2 - \|y\|^2)$
- $\|x+y\|^2 + \|x-y\|^2 = 2(\|x\|^2 + \|y\|^2)$

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Question Summary : (Attempted Question)

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Question No : 30 of 41

An orthonormal set M is an orthogonal set in an inner product space whose elements have norm ....

Answer (Please select your correct option)

- equal to 1
- >1
- <1
- None of these

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Question No : 6 of 41

Which one of the following axioms hold for any vectors u, v, w in vector space X and k, a, b in field K ?

Answer (Please select your correct option)

- $u+(-u)=(-u)+u$, for each $u \in X$
- $u+w=w-u$
- $k(u+v)=ku-kv$
- $(ab)u=a(ku)$

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MTH641 Functional Analysis

Question No : 13 of 41 Marks: 1 (Budgeted Time M

A finite dimensional normed space is .....to its second dual.

Answer (Please select your correct option)

- isometric
- isomorphic
- homomorphic
- none of these

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MTH641 Functional Analysis

Question No : 15 of 41

The dual space of l^1 is .....

Answer (Please select your correct option)

- l^p
- l^∞
- l^2
- l^1

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Question Summary : (Attempted Question)

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Conduct Instructions

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MTH641 Functional Analysis

Question No : 40 of 41 Marks: 5 (Budgeted Time Min)

Show that $\varphi: X^* \to l^\infty$ is linear.

Note: The following information may be used to prove the above argument

Let X^* be the dual space of l^1. The space $X = l^1$ consists of all sequences $\{x_i\} = x$ with $\|x\| = \sum_{i=0}^{\infty} |x_i| < \infty$. Here X^* is isometric to l^∞ where l^∞ space is collection of all sequences $c = \{c_i\}$ such that $\|c\| = \sup_{i=1}^{\infty} |c_i| < \infty$. Mapping $\varphi: X^* \to l^\infty$ is defined by $\varphi(f) = c_f$

Let $f \in X^* (f: l^1 \to R \text{ or } C)$ then with standard basis $\{e_1, e_2, \ldots\}$ each $x \in l^1$ can be written as $x = \sum_{i=1}^{\infty} x_i e_i$, so

Answer (Please click here to Add Answer)



MTH641 Functional Analysis

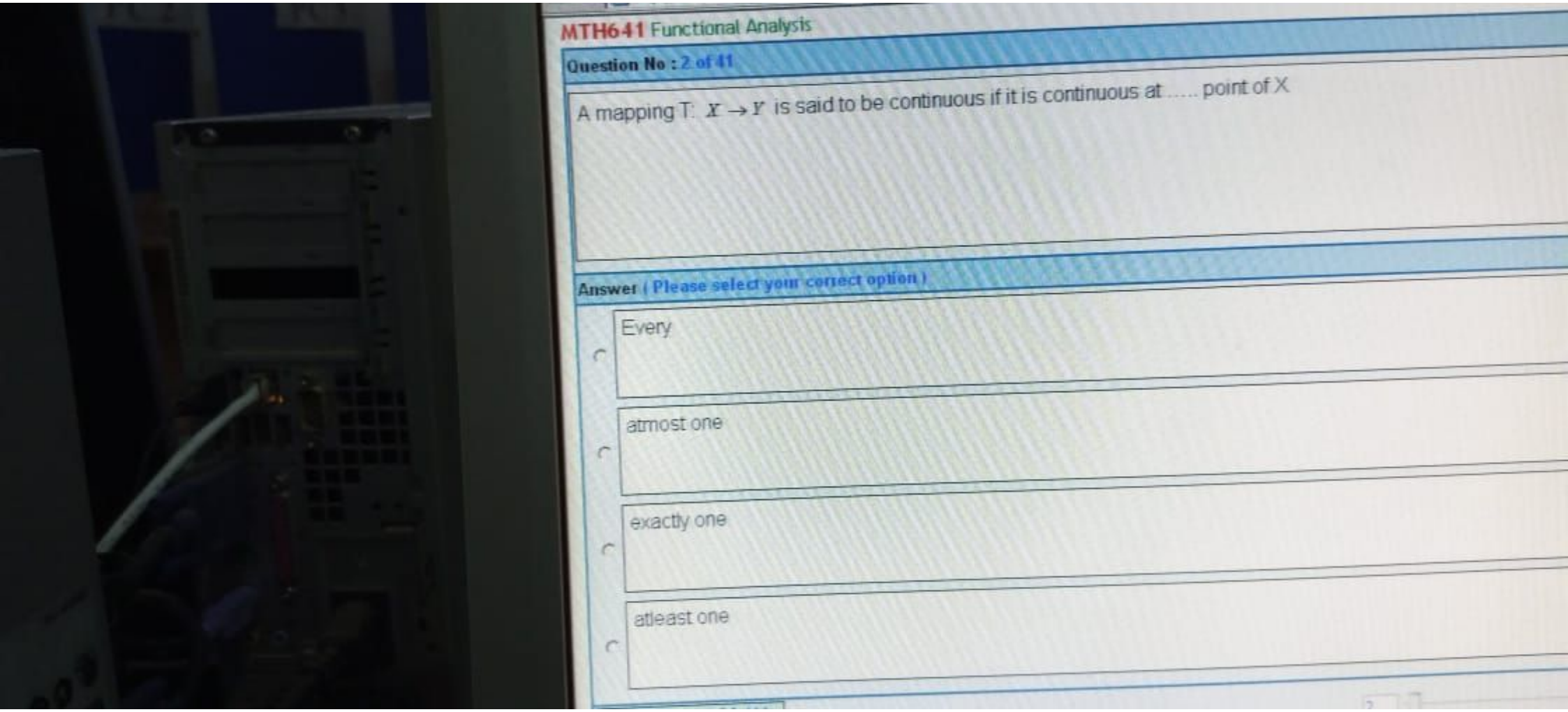
Question No : 33 of 41 Marks: 2 (Budget

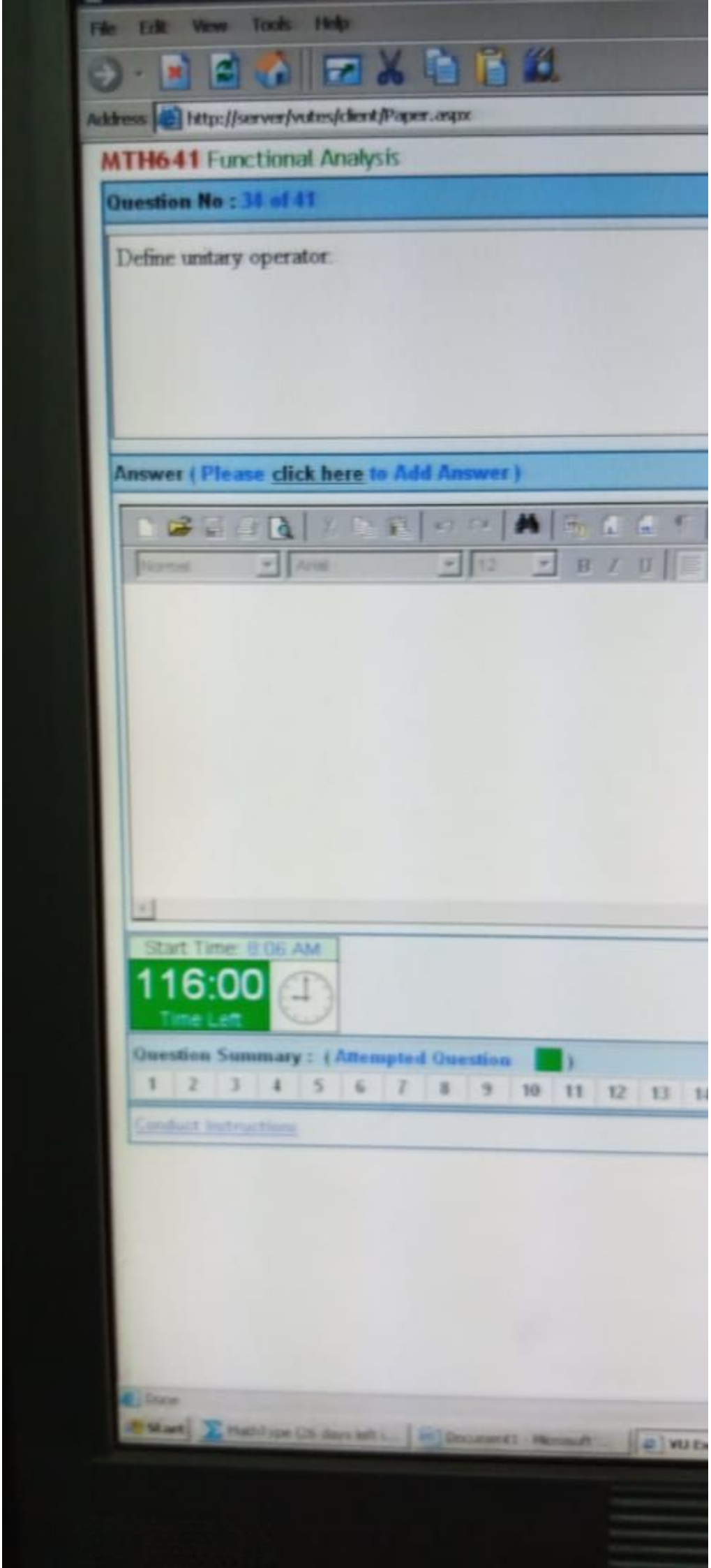
In an inner product space V, the function $\|\ .\ \| : V \to R^+$ given by $\|x\| = \sqrt{\langle x, x \rangle}$, $x \in V$ defines a norm in V. Show that $\|x\| = 0 \Leftrightarrow x = 0$.

Answer (Please click here to Add Answer)

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MTH641 Functional Analysis
Question No : 2 of 41
A mapping T: $X \to Y$ is said to be continuous if it is continuous at ..... point of X
Answer (Please select your correct option)
Every
atmost one
exactly one
atleast one


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MTH641 Functional Analysis
Question No : 34 of 41
Define unitary operator.
Answer (Please click here to Add Answer)
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