YOUTUBE CHANNEL: S KHAN ACADEMY

MTH631 QUIZ FILE

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the term-by-term differentiation of the series is S(x)= $\sum_{n=0}^{\infty}(-1)^n\frac{x^{2n+1}}{(2n+1)!}$

$\sum_{n=0}^{\infty}(-1)^n\frac{x^{2n}}{(2n)!}$

The linear term of Taylor' series of f(x)= $\sin x$ **about** $x=0$ **is;**

1

If a power series $\sum_{n=0}^{\infty}a_n(x-x_0)^n$ **converges to a function** $f(x)$**, then the domain of** $f(x)$ **is …….as that of the interval of convergence of power series.**

Same and equal

The infinite series expansion of $\cos x$ **for** $-\infty<x<\infty$ **is given by**

$\sum_{n=0}^{\infty}(-1)^n\frac{x^{2n}}{2n!}$

Which of the following can never be as the precise set of points of convergence of a power series ?

Intersection of open interval on Real Line

Let f be defined by a power series with finite radius of convergence R. then $\lim_{x\to(x_0+R)^-}f(x)=\sum_{n=0}^{\infty}a_nR^n$ **only if**

$\sum_{n=0}^{\infty}a_nR^n$ **converges**

The radius of convergence of the power series $\sum_{n=1}^{\infty}a_n(x-x_0)^n$ **is**

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$$\frac{1}{R}=\lim_{n\to\infty}\left|\frac{a_{n+1}}{a_n}\right|$$

If the two power series $\sum_{n=0}^{\infty}c_nx^n$ and $\sum_{n=0}^{\infty}d_nx^n$ defined on the same interval of convergence say $(-r,r),r>0$ such that, $\sum_{n=0}^{\infty}c_nx^n=\sum_{n=0}^{\infty}d_nx^n$,then……where $n\geq 0$.

Necessarily $c_n=d_n$

If (-R,R) the interval of convergence of the power series $f(x)=\sum_{n=0}^{\infty}a_nx^n$,then the convergence of power series at $x=\pm R$, depend on the …….

Continuity of $f(x)$

In the definition of uniform convergence, the natural number N always depend on

(epsilon)

Let f be defined by power series with finite radius of convergence R. then $\lim_{x\to(x_0+R)^+}f(x)=\sum_{n=0}^{\infty}a_nR^n$ only if

$\sum_{n=0}^{\infty}a_nR^n$

For a power series ,if the radius of convergence is R=∞ ,then power series is said to;

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converge everywhere in the given domain

The Taylor series of an infinitely many differentiable functions "f(x)" ……. converges to "f(x)".

Not necessarily

For the power series $f(x)=\sum_{n=0}^{\infty}c_n x^n, x\in R$ **then** $c_n=$.....

$\frac{f^{(n)}(0)}{n!}$

For the power series $f(x)=\sum_{n=0}^{\infty}a_n x^n$ **,the expression:** $\int_{\alpha}^{\beta} f(x)=\sum_{n=0}^{\infty}\frac{a_n}{n+1}(\alpha-\beta)$ **holds only if** α **and** β **lie……of interval of convergence of** $f(x)=\sum_{n=0}^{\infty}a_n x^n$ **.**

At the boundary

The power series $f(x)=\sum_{n=0}^{\infty}(n!)x^n$ **converges …….**

$\forall x\in R$

The limit of a uniformly convergent series of integrable functions is always

Integrable

The term-by-term differentiation of the series $\sum_{n=0}^{\infty}(-1)^n\frac{x^{2n}}{(2n)!}, -\infty<x<\infty$

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$\sum_{n=0}^{\infty}(-1)^n \frac{x^{2n+1}}{(2n+1)!}, -\infty < x < \infty$

Quiz 2

In $R^n, \lim_{X \to X_0} f(X) = -\infty,$ **if**

$\lim_{X \to X_0} (-f)(X) = \infty$

If f(t)= $\sqrt{t}, g(x,y) = 1 - x^2 - 2y^2$ **,then the domain** $fog = - - - - -$

R^2

The domain of the real valued function $f : R^n \to R$ **defined and given by;**

$f(X) = \left(1 - x_1^2 - x_2^2 - ..... - x_2^n\right)$ **is……**

$\{X \mid |X| = 1\}$

If $g(x,y) = \sqrt{1 - x^2 - 2y^2}$, $f(t) = \begin{cases} \frac{\sin t}{t}, & t \neq 0 \\ 1, & t = 0 \end{cases}$,

The domain of $fog = - - - - - - -,$

R^2

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In $R^2, f(x,y)=\begin{cases}\dfrac{\sin\sqrt{1-x^2-2y^2}}{\sqrt{1-x^2-2y^2}}, & x^2+2y^2<1\\ 1, & x^2+2y^2=1\end{cases}$

$is---------on$

$x^2+2y^2=1$

Continuous

In R^n**,monotonically, limit inferior and superior of sequences, and divergence to** $\pm\infty$ **are undefined for n>1 because** R^n **is--------,**

Not ordered for n>1

If $f(x,y,z)=\cos\left(\dfrac{1}{x^2+2y^2+z^2}\right) then \lim_{X\to+\infty} f(X)=-----.$

1

$\lim_{(x,y)\to(a,b)} \dfrac{\sin\sqrt{1-x^2-2y^2}}{\sqrt{1-x^2-2y^2}}=1, if\ -----.$

$(a^2+2b^2)=1$

In $R^n, f(X)=\dfrac{1}{|X-X_0|}, and \lim_{X\to X_0} F(X)=\infty, then f(X)>M>0\Rightarrow 0<|X-X_0|<\delta=-----.$

$\frac{1}{M}$

The domain of the real valued function $f: R^2\to R$ **defined and given by;**

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$f(X)=\frac{\sin\sqrt{1-x^2-2y^2}}{\sqrt{1-x^2-2y^2}}$ **is--------of the region by the ellipse** $x^2+2y^2=1$

Interior and boundry

Quiz:3

- **Both** $x=x_0+sV \text{ and } x=x_0+tU,-\infty<s,t<\infty$ **represent the same line through** $X_0 \text{ in } R^n$ **if, ----------**

All of the above.

- **If** $L: X=(-1,3,-1)+t(2,-4,0),-\infty<t<\infty$ **is the equation of the line through (-1,3,-1) in the direction of vector (2,-4,0) in R^3 , then the line segment on L, when t=1 is ----------**

- **The set** $\{(x,y):-n<x,y<n,(x,y)\pm(0,0),n\in N\}$ **is……in R^2. --------**

neither open nor closed

- **The equation of a line through a point** $X_0=(x_0;y_0;z_0) \text{ in } R^3$ **can be written parametrically as----------**

--

- **-all of the above.**

- **If X and Y are in R^n, then** $|X+Y|^2\le$ **----------**

- $|X|^2+2|X||Y|+|Y|^2$

- **The ε-neighborhood at X_0 in R^n is the set points……of the sphere of radius ε and center at X_0. ----------**

- **inside and on the boundary.**

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- **If X and Y are in R^n, then $|X+Y|$----------**
  - $\geq |\,|X|-|Y|\,|$
- **Which of the following can be served as counter example for the scalar multiplication operation in R^n for the axioms:1X=X, $\forall X \in R^n$?----------**

  $\alpha(x_1, x_2, ...x_n) = (\alpha x_1, \alpha x_2, ...\alpha x_n), \alpha \in R$
- **Topological properties of R^n can be described in the terms of special class of subset, called----------in R^n. ----------**
  - **all are equivalent.**
- **Boundary of the set $\{(x,y) : -n < x, y < n, (x,y) \pm (0,0), n \in N\}$ in R^2 is----------**

  - $\{(x,y) \in R^2 \mid x = \pm n, y =< n, (x,y) \pm n, n \in N\} \cup \{(0,0)\}$
- **If X_0 is a point in R^n and r is a +ve number, the open n-ball of radius r about X_0 in the set $B_r(X_0)$={X| |X-X_0|…….}.----------**

  - **<r**
- **The equation of the line through a point X_0 ={x_0; y_0;z_0} in R^3 can be written parametrically as…… $-\infty < t < \infty$ where $u_1, u_2, u_3 \neq 0$.---------**
  - **all of the above.**
- **If the points 0, X,Y and X+Y are joined to form a parallelogram in R^n of sides |X| and |Y|, then its diagonal is represented by----------**
  ----------|X|+|Y|
- **In the schwarz's Inequality; $|X,Y| \leq |X||Y|, \forall\, X, Y \text{ in } R^n$,the equality holds for-----**

  - **All above are valid.**

In R^4 let $\bar{x} = (1,-3,5,6)$ *and* $\bar{y} = (2,-4,3,\frac{1}{2}), \bar{x}+\bar{y} =$ **----------**

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- **(3,-7,8,6,5)**
- **$|\bar{x}|$ is the distance between x and ----------**
- **the origin.**
- **A sequence of points $\{X_r\}$ in R^n converges if and only if for each……there is an integer K such that…… if $r,s \geq K$ ----------**
- $\varepsilon > 0, |X_r - X_0| < \varepsilon$
- **The vector sum of $\bar{x} = (x_1, x_2, x_3, x_4, x_5, x_6)$ and $\bar{y} = (y_1, y_2, y_3, y_4, y_5, y_6)$ is $\bar{x} + \bar{y} =$ ----------**
- $(x_1 + y_1, x_2 + y_2 ....., x_6 + y_6)$
- **If X and Y are in R^n, then $|Y - X|$ ----------**
- $\geq |X| - |Y|$
- **If X and Y are in R^n , then----------**
- $|\bar{x} - \bar{y}| + |\bar{y} - \bar{z}| - - - - - - - - |\bar{x} - \bar{z}| \leq$

If $\bar{x}$ and $\bar{y}$ are in R^n and a is a scalar, then $(a\bar{x}).\bar{y}$ =----------

both a and b

- **If $\bar{x}$ and $\bar{y}$ are in R^n , then…….is called triangle inequality--------**
- $|\bar{x} + \bar{y}| \leq |\bar{x}| + |\bar{y}|$
- **If $\bar{x}$ are in R^n and a is a scalar, then $(a\bar{x})$,then $|a\bar{x}|$ ----------**
- $= |a|\,|x|$
- **Limit points of $S = \{(x, y) : -n < x, y < n, (x, y) \neq (0,0), n \in N\}$ in R^2----------**
- $\{(0,0)\} \cup \{(x, y) : x, y = \pm n, n \in N\} \cup S$
- **Closure of the set $\{(x, y) : -n < x, y < n, (x, y) \neq (0,0), n \in N\}$ in R^2 is----------**
- $\{(x, y) : -n \leq x, y \leq n, n \in N\}$

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- **A sequence of points $\{X_r\}$ in R^n converges to the limit $\bar{X}$ if----------**
- $\lim_{r\to\infty} |X_r - \bar{X}| = 0$
- **The length of the vector $\bar{x} = (x_1, x_2, 3, x_4, 5)$ is $|\bar{x}|$ =---------**
- $\bar{x} = (x_1^2 + x_2^2 + x_4^2 + 34)^{\frac{1}{2}}$
- **If X and Y are in R^n , then $|X+Y|^2$ =----------**

  $|X|^2 + 2(X.Y) + |Y|^2$
- **Exterior of the set $\{(x,y) : -n < x, y < n, (x,y) \neq (0,0), n \in N\}$ in R^2 is----------**

  $\{(x,y) \in R^2 \mid\mid x| > n, |y| > n, n \in N\}$

In R^n, a function f is differentiable at $X_0 \Leftrightarrow \exists$ a linear function L in a way that $f(X) - f(X_0)$ can be approximated near X_0 by L satisfying;

- $L(X - X_0) = LX - LX_0$

In R^n, f, f_x, f_y and f_{xy} exist on neighborhood N of (x_0, y_0) .then $f_{yx}(x_0, y_0)$ exists, and $f_{xy}(x_0, y_0) = f_{yx}(x_0, y_0)$ because if f_{xy} is---------.

Differentiable

If f is continuous on a compact set S is R^n, then f---------- on S.

Is also uniformly continuous

A sufficient condition for a function of several variables to be differentiable at point is

All partial derivatives exists and are continuous at that point

In $R^2, f(X) = |X|^2$ and $\Phi = \left(\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}\right)$, then $\frac{\delta f(X)}{\delta \Phi}$ =

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$\frac{x_1 + x_2}{\sqrt{2}}$

Let f be defined and continuous on a region S in R^n. Suppose that X_1 and X_2 are in S and $f(X_1) < Y < f(X_2)$. then $f(X) = Y$ ----------X in S.

For some

In R^2, $\lim_{(x,y)\to(2,2)} \frac{\sin(x-y)}{\sqrt{x-y}} =$ --------.

0

How many third order partial derivatives of $g(x,y) = xy + x^2y^3$ exist in R^3?

8

If a function f is continuous on a compact set S in R^n, and $\alpha = \inf_{X\to S} f(X), \beta = \sup_{X\to S} f(X)$, then $f(X_1) = \alpha$ and $f(X_2) = \beta$ ----------X_1 and X_2 in S.

For some

Identify the false statement (s)

The partial derivative of function

$f(x,y,z) = 3xyz + 2x^2 + z^2$

With respect to third variable is

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In R^n, a function f is differentiable at $X_0, \Leftrightarrow \exists$ a linear function L in a way that $f(X)-f(X_0)$ can be approximated near X_0 by L satisfying $L(X \pm X_0) = LX \pm LX_0$ such that $f(X)-f(X_0)=L(X-X_0)+E(X)\left(\left|X-X_0\right|\right)$ and $\lim_{X \to X_0} E(X)$

=0

A set $A \subset R$ of real numbers is ----------if there exists a real number $m \in R$, such that $x \geq m \quad x \in A$

Bounded below

Analogous to the derivative of a function of one variable in R^2, the derivative of a function f at X_0 in R^n has values(s).

Infinite many

If a function f is continuous on a compact set S in R^n, then f is ----------on S

Bounded

If $g(x,y)=\sqrt{1-x^2-2y^2}$, $f(t)=\begin{cases}\dfrac{\sin t}{t}, & t \neq 0 \\ 1 & t=0\end{cases}$,

$\{(x,y): x^2-2y^2 \leq 1$

In R^n, if the first order partial derivative of a function $f(X)$ exist at X_0 then it is essentially continuous at X_0

False

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In R^n,the function $f(X)$ is continuous at X_0,if $\lim_{X\to X_0} f(X) = f(X_0)$,then----------.

X_0 is in the domain D_f and limit point of D_f

Let f be defined on an interval I in R^2.suppose that x_1 and x_2 are in I and $f(x_1) < y < f(x_2)$ then $f(x) = y$ for some x in I.

True

If f(x,y,z)= $\cos\left(\frac{1}{x^2+2y^2+z^2}\right)$ then $\lim_{|X|\to\infty} f(X)$=----------.

1

The domain of the real valued function $f: R^n \to R$ defined and given by ;

$f(X) = \left(1 - X_1^2 - X_2^2 - ..... - X_2^n\right)^{-1}$ is---------.

$\{X \mid\mid X \mid \neq 1\}$

Equations of tangent plane to z=xysin(xy) at $(1, \frac{\pi}{2})$ is --------.

$$x = \frac{\pi}{2}x + y - \frac{\pi}{2}$$

InR^2, if the function of one variable is differentiable at $x = \alpha$, the curve y=f(x) is approximated by $f(\alpha) + f'(\alpha)(x - \alpha)$ so that ----------.

$$\lim_{x\to\alpha} \frac{f(x) - [f(\alpha) + f'(\alpha)(x-\alpha)]}{x-\alpha} = 0$$

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Equation of tangent plane to $z = 2x + 3y - 1$ at (1,-1) is ---------.

$$z = 2x + 3y - 1$$

In R^3, if the function of two variable is differentiable at $(x, y) = (\alpha, \beta)$, then the curve x=f(x,y) is approximated by $f(\alpha, \beta) + f_x(\alpha, \beta)(x - \alpha) + f_y(\alpha, \beta)(y - \beta)$ such that;

$$\lim_{(x,y)\to(\alpha.\beta)} \frac{f(x,y)-[f(\alpha,\beta)+f_x(\alpha,\beta)(x-\alpha)+f_y(\alpha,\beta)(y-\beta)]}{\sqrt{(x-\alpha)^2+(x-\beta)^2}} = 0$$

InR^n, a function f is said to have the local minimum point at X=A, if the following inequlity holds $\forall\ X \in D_f \cap S_E(A)$.

$$f(X) \geq f(A)$$

InR^3, the equation of tangent plane to the surface $z = x^2 + y^2 - 1$ at (-1,1) is ----

$$x = -2x + 2y - 3$$

A tangent plane to the surface $z = f(x, y)$ is always the limit of the ------.

Secant plane

InR^n, a function f is said to have the local maximum point at X=A, if the following inequlity holds $\forall\ X \in D_f \cap S_E(A)$.

$$f(X) \leq f(A)$$

InR^3, a function $f(x, y)$ is differentiable at $A = (\alpha, \beta)$, if $f(X) = f(A) + f_x(A)(x - \alpha) + f_y(A)(x - \alpha) + E(X)(|X - A|)$ such that ------.

$$\lim_{X\to A} E(X) = 0$$

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Grand Quiz

An element $F_n(0) \in F_n(x) = \frac{1}{n+x}, n \in N, x \in R, is ---------.$

Convergent

For the power series f(x) = $\sum_{n=0}^{\infty} c_n x^n, x \in R, the c_n = -------.$

$\frac{f^{(n)}(0)}{n!}$

A series of function $\sum f_n$ **is said to converge absolutely on asset S, if the series** $\sum |f_n|$ **converges----------on S.**

Pointwise

The series: $\sum_{n=1}^{\infty} (-1)^n$ **---------**

Oscillating

If a function is defined in neighborhood of 0 as ; $f(x) = \begin{cases} e^{\frac{-1}{x^2}}, & x \neq 0, \\ 0, & x = 0 \end{cases}$ **then Taylor series of f about 0 is**

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$\sum_{n=0}^{\infty} 0$

If $\{f_j\}_k^{\infty}$ is a sequence of real valued functions defined on a set D of real numbers, then $\sum_{j=k}^{\infty} f_j$ is a(n)----------of functions on D.

Infinite series

The limit function of the sequence of function defined by $F_n(x) = x^n, x \in [0,1), is$ ----------.

Continuous

The infinite series expansion of cosx for $-\infty < x < \infty$ is given by

$\sum_{n=0}^{\infty} (-1)^n \frac{x^{2n}}{2n!}$

The power series $\sum_{n=0}^{\infty} \frac{1}{n!} x^n$ converges----------.

$\forall x \in R$

For the sequence of function, uniform convergence $\Rightarrow$ point-wise convergence.

False

A given function ''f(X)'' can be represented as the sum of a convergent power series in ''x''. if f(X) must have (be) -----in the neighborhood of X=0.

Derivatives of all order

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The series $\sum f_n$ converges uniformly on S if $\|f_n\|_S \le M_n, n \ge k,$ where $\sum M_n < \infty$ is called ----------.

Both a and b

Let $\|g\|_S = \sup_{x \in S} |g(x)|.$ if g and h are defined on S, then----------.

$$\|gh\|_S \le \|g\|_S \, \|h\|_S$$

If the graph of sequence of function $\{F_n(x)\}$ for all $n > N$ and for $x \in S$ lies between the graphs of $f(x) - \in$ and $f(x) + \in$, within the height of $2 \in$ situated symmetrically about the limit function, then $\{F_n(x)\}$ converges----------on S.

Uniformly

Let $\{F_n(x)\}$ be the sequence of functions on $D \subseteq R$, if to each $x \in D$ and to each $\in > 0$ there corresponds a positive integer m such that $|F_n(x) - F(x)| < \in \forall n \ge m$, then we say that $\{F_n(x)\}$ converges----------, to the function F(x) on D.

Uniformly

A sequence of differentiable functions converging uniformly to a differentiable function , the limit of derivatives is-------equal the derivative of the limit function.

Not

If f(x) is infinitely differentiable on (-1,1), then Taylor series of f(x) about x=0, can be

f(x)= $\sum_{n=0}^{\infty} \frac{f^{(n)}(0)}{n!} x^n,$ provided that; ---------, where $a_n \in (-1,1)$.

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$\lim_{n\to\infty} \frac{f^{(n+1)}(a_n)}{(n+1)!} x^{n+1} = 0$

For the power series; $f(x) = \sum_{n=0}^{\infty} (-1)^n \frac{x^{2n+1}}{(2n+1)!}$, $f'(x) =$ **---------.**

$\sum_{n=0}^{\infty} (-1)^{n-1} \frac{x^{2n}}{(2n)!}$

For apply Weierstrass' M-test, which of the following can be taken as dominating series for the uniform convergence of $\sum_{n=1}^{\infty} \frac{1}{n^3 + n^4 x^2}, x \in R$?

$\sum \frac{1}{n^3}$

The power series expansion of f(x)= $\sin x$ **about** $x_0 = 0$ **is**

$\sum_{n=0}^{\infty} (-1)^n \frac{x^{2n+1}}{(2n+1)!}, -\infty < x < \infty$

If a series of function converges absolutely uniformly on a set S, then it------ converges(s) uniformly on S.

Necessarily

If $\sum f_n$ **converges uniformly on S, then** $\lim_{n\to\infty} \| f_n \|_S =$ **----------.**

0

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If f(x) is periodic function with period ω, then $\int_c^{c+\omega} f(x)dx =$ ----------

whenever f is integrable on $[0,\omega]$

$\int_0^w f(x)dx$

Consider $F_n = \frac{1}{x^2+n^3}$, the series of function $\sum_{n=1}^{\infty} F_n$ is----------by the series $\sum \frac{1}{n^3}$ because $|F_n| < \frac{1}{n^3} = M$. We know that $\sum \frac{1}{n^3} < \infty$.

Dominated

For $x \neq 0$, the nth partial sum S_n of the partial series;

$1 + x + x^2 + ... + x^{n-1}$ as $n \to \infty$,is….,

$\frac{1}{1-x}$

An element $F_n(0) \in F_n(x) = n + x, n \in N, x \in R$ IS----

Convergent

A sequence of differentiable functions converging point-wise to a differentiable function, the limit of derivatives is------equal the derivative of the limit function.

Necessarily

There is---------value ω of a periodic function f called the primitive period (or the basic period or the fundamental period)

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Smallest positive

The power series $\sum_{n=0}^{\infty} x^n$ converges----------

$\forall x \in R$

If $f(x)$ and $g(x)$ are periodic with the ------ω, then $h(x) = af(x) + bg(x)$ is also periodic

Same period

In the definition of uniform convergence, the natural number N always depend on

$\in$(epsilon)

For the series, $x + \frac{(2!)^2}{4!}x^2 + \frac{(3!)^2}{6!}x^3 + ... + \frac{(n!)^2}{(2n)!}x^n$+……., the radius of convergence

4

Point-wise convergence of sequence of functions, is a -----property

Local

The uniform convergence is-----to transfer the properties of continuity, differentiability or integrability to limit function.

Strong

enough

If we have

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$f(x)=\sum_{n=0}^{\infty}a_n(x-x_0)^n, |x-x_0|<R,$

$a_n=\frac{f^{(n)}(x_0)}{n!}$

If the series $\sum_{j=1}^{\infty} f_j(x)$ converges on S ,then…….. $\forall x \in S$ as $k \to \infty$

$f_j(x) \to 0$

For the sequence of function $\{F_n(x)\}$ defined as; $F_n(x)=\left(\frac{nx}{1+n^2x^2}\right), x\in[0,1].$ then,

$\|F_n(x)\|_{[0,1]}$ **=----**

$\frac{1}{2}$

For a power series, if the radius of convergence is $R=\infty$, then power series is said to:

Converge everywhere in given domain

Let f be defined by power series with finite radius of convergence R. then $\lim_{x\to(x_0+R)^+} f(x)=\sum_{n=0}^{\infty}a_nR^n$ only if

$\sum_{n=0}^{\infty}a_nR^n$

For the sequence of the functions defined as;

$F_n(x)=\tan^{-1}nx, x\geq 0$**, the limit function is----------**

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$$\begin{cases} \frac{\pi}{2} & , x > 0 \\ 0 & , x = 0 \end{cases}$$

If the sequence of function defined and converges pointwise as ,

$\lim_{n\to 0} F_n(x) = \lim_{n\to 0}\left(1-\frac{x_n}{n}\right) = 1 = F(x), 0 \le x \le 1$ **.then** $\sup_{x\to[0,1]} |F_n(x) - F(x)|$ ----------

0

For the power series; $\sum_{n=0}^{\infty}(-1)^n.\frac{x^{2n}}{(2n)!}$, $f'(x) =$ ---------.

$\sum_{n=0}^{\infty}(-1)^n.\frac{x^{2n+1}}{(2n+1)!}$

If the sequence of values $\{F_n(x)\}$ **converges for each** x **in some subset S of D, then defines as----------**

Limit function

Radius of convergence of the power series $\sum_{n=1}^{\infty}\frac{n^n}{n!}x^n$ **is----------**

e^{-1}

For the sequence of functions $\{F_n(x)\}$ **defined and converges pointwise as;**

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$F_n(x)=\frac{nx}{1+n^2x^2}, x\in[0,1]$, **the value of** $\lim_{n\to 0}\|F_n(x)-F(x)\|_{[0,1]}\Rightarrow\{F_n(x)\}$ **is----------, where** $\lim_{n\to 0}F_n(x)=F(x)$.

Uniformly convergent

An element $F_n\left(\frac{1}{2}\right)\in F_n(x)=\sum_{n=1}^{\infty}x^n, n\in N, x\in R,$ **is convergent to----------.**

$\frac{1}{2}$

For $|x|\geq 1,$ **the series:** $1+x+x^2+.....+x^{n-1}----------$

Converges uniformly

If $\{F_n(x)\}$ **is a sequence of function defined on domain** $D\subseteq R$**, the sequence** $c\in D$ **the sequence;**

$\{F_n(c)\}=\{F_1(c),F_2(c),F_3(c).....\}$ **is a sequence.**

Real number

For the series of function $\sum_{j=k}^{\infty}f_k$ **defined on domain** D**, if the sequence of partial sum** S_n **converges uniformly on domain D, then the given series----------converges uniformly on D.**

Necessarily

If $\{F_n\}$ **converges pointwise to F on S converges----------to F on S**

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Pointwise

Topological properties of R^n can be described in term of special class of subset called----------

Closed set

The value of x in a specific interval for which a given power series converges is called----------

Interval of convergence

For applying weierstrass' M-test, which of the following can be taken as dominating series for the uniform convergence of $\sum_{n=1}^{\infty}\frac{e^{-2nx}}{4n^2-1}, x \geq 0$?

$\sum\frac{1}{4n^2}$

To check uniform convergence of $\sum\frac{1}{x^2+n^2}$ we can use and apply----------

choose the best answer.

Both a and b

For the sequence of function $\{F_n(x)\}$ defined and converges point wise as;

$$\lim_{n\to\infty} F_n(x) = \frac{\sin n\pi}{\sqrt{n}} = 0 = F(x), x \in [0, \pi],$$

Non-uniformly convergent

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The method of testing the uniform convergence of a series $\sum f_j$ of functions by definition is hard because----------.

Finding the S_n (nth partial sum) is not always easy.

For the sequence of function defined by $F_n(x) = nx(1-x)^n, x \in (0,1)$, the limit function is ----------.

0

Which of the following is the basis for a lower limit topology on R (the Set of Real Number)?

$B_l = \{[a,b) \mid a,b \in R\}$

If X and Y are in R^n, then $|X-Y|$------.

$\geq \|X|-|Y\|$

Power series is a ------case of series of functions in a given domain S.

Special

In the Schwarz's Inequality; $|X.Y| \leq |X||Y|, \forall X, Y$ in R^n, the equality holds for ----------.

All above are valid

Let $\{F_n(x)\}$ be a sequence of functions converges uniformly on $D \subseteq R$ to $F(x)$ such that to each $x \in D$ and to each $\in > 0$, there corresponds a positive integer m such that $|F_n(x) - F(x)| < \in \forall n \geq m$. Then

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$m = m(x, \in)$

For X $\neq 1$, the nth partial sum S_n of the series:

$1 + x + x^2 + \ldots\ldots\ldots\ldots + x^{n-1}$, **is----------.**

$\frac{1-x^n}{1-x}$

If X and Y are in R^n, then $|X+Y|^2 \leq$ ----------.

$|X|^2 + 2|X||Y| + |Y|^2$

The continuity of limit function of the series solution of certain class of partial differential equations can be proved by proving just its------convergence.

Pointwise

For applying Weierstrass' M-test, which of the following can be taken as dominating series for the uniform convergence of $\sum_{n=1}^{\infty}(a^n \cos nx)$, where $0 < a < 1$ and $x \in R$?

$\sum a^n$

The power series expansion of $f(x) = \sin x$ about $x_0 = 0$ is

$\sum_{n=0}^{\infty}(-1)^n \frac{x^{2n+1}}{(2n+1)!}, -\infty < x < \infty,$

A sequence $\{F_n(x)\}$ of fixed constant defined and given as:

$F_n(x) = k, \forall n \in N$ **and** $x \in S$ ----------.

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Converges pointwise only

The series $\sum f_n$ converges uniformly on S if $\|f_n\|_S \le M_n, n \ge k,$ where $\sum M_n < \infty$ is called----------

Both a and b

A power series can be differentiated term –by –term----------internal of convergence.

At the extreme point of

Which of the following does not hold for an inner product function $(.,.): V \times V \to F$.

$< v,u >=< u,v >$

By omitting or inserting some finite terms in a series will NOT affect which of following?

Convergence or divergence of the series

The condition of absolute convergence (pointwise or uniform) is ----------than the usual convergence(pointwise or uniform).

Stronger

By Cauchy criterion the series $\sum_{j=0}^{\infty} x^j, --------$ convergent on $[-r,r]$.

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Is uniformly

For the sequence of function defined by $F_n(x)=\frac{\sin nx}{\sqrt{n}}, x\in R$ **the identity;**

$\frac{d}{dx}\left(\lim_{n\to\infty}F_n(x)\right)=\lim_{n\to\infty}\frac{d}{dx}\left(F_n(x)\right)$ *is* $----------$.

True

If a series function $\sum f_n$ **converges uniformly on S , and for every** $\in>0$**,**

$\|f_n\|_S+\|f_{n+1}\|_S+.....+\|f_m\|_S<\in,$ **whenever** $m,n\geq N,$ **then----------.**

$\|f_n+f_{n+1}+.....+f_m\|_S<\in$

If $(-R,R)$ **is the interval of convergence of a power series** $\sum_{n=0}^{\infty}a_n\left(x-x_0\right)^n$**, then which of the following is true?**

All

above statement are true

If a series converges absolutely uniformly on S, then

It converges

uniformly on S

Which of the following does not hold for an inner product function $\langle .,.\rangle : V\times V\to F.$

$\langle cu,v\rangle=c\langle u,cv\rangle$

Which of the following is not an axiom of the vector space $V.u,v,\omega\in V$ **and** $c\in F$**.**

$u+(-u)=v$

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Convergence of the sequence $\{F_n\}$ is NOT uniform, if there exist $\in > 0$ such that to each integer N there correspond an integer $n > N$ and a point $x_n \in S$ for which we have;

$$|F_n(x_n) - F(x_n)| \geq \in$$

For applying weierstrass', M-test, which of the following can be taken as dominating series for the uniform convergence of $\sum_{n=1}^{\infty} \frac{\sin(x^2 + n^2 x)}{n(n+2)}, x \in R$?

$$\sum \frac{1}{n^2}$$

If $f(x) = \sin x$, then

$$\left\| f^k \right\|_{(-\infty,\infty)} = 1, k \geq 0$$

Let $\|g\|_S = \sup_{x \in S} |g(x)|$, if g and h are defined on S. then----------

$$\|gh\|_S \leq \|g\|_S \|h\|_S$$

In which of the following case, convergence of series of function at some of points in a given domain ''S'' can be omitted?

Term by term integration

A series----------on a set S if and only if for each $\in > 0$ there is an integer N such that $\|f_n + f_{n+1} + \ldots\ldots\ldots\ldots + f_m\|_S < \in$ if $m \geq n \geq N$

Divergent uniformly

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If $f(x)=\sum_{n=0}^{\infty}a_n(x-x_0)$, having $R>0$ as a radius of convergence, and $f(x)$ is continuous and differentiable in the interval of convergence, then radius of convergence of $f'(x)$ is----------

$R+h, h>0$

Fourier series expansion of a function is a representation of the function as a linear combination of

Sines and cosines

The values of x in a specific interval for which a given power series converges is called

Interval of convergence

If $(-R,R)$ is the interval of convergence of the power series $f(x)=\sum_{n=0}^{\infty}a_n x^n$, then the convergence of power series at $x=\pm R$, depend on the ----------.

Length of interval of convergence

The partial sum of $\sum_{j=k}^{\infty}f_j$ are defined by F_n=----------

$\sum_{j=k}^{\infty}f_j, n\geq k$

Point of non-uniform convergence for the sequence $\{F_n(x)\}$ defined by; $\{F_n(x)\}$

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X=0.5

For $x=1$, the nth partial sum S_n of the series:

$1+x+x^2+.....+x^{n-1}$

n

which of the following can be taken as dominating series for the uniform convergence of $\sum_{n=1}^{\infty}\left(\frac{1}{x^2-n^2}\right)$?

$\sum\left(\frac{1}{n^2}\right)$

There is a ----------value ω of a periodic function f called the primitive period (or the basic period or the fundamental period) of $f(x)$.

Smallest positive

A power series can be differentiated term-by-term----------the interval of convergence.

At the extreme point of

For the series : $F_n(x)=1+x+x^2+.....+x^{n-1}$ in $(-1,1)$, if $\sum_{j=0}^{\infty}x^j=\frac{1}{1-x}$, then

$\forall n\in N,\left\|F_n(x)-\frac{1}{1-x}\right\|$ **----------,where** $-1<r<1$

$\geq\frac{1}{2}$

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Which of the following can be served as counterexample for scalar multiplication operation in R^n for the axioms; $1X = X, \forall X \in R^n$?

$a(x_1, x_2, ..., x_n) = (ax_1, ax_2, ...ax_n), a \in R$

For the sequence of function defined by $F_n(x) = \frac{x}{1+nx}, x \geq 0$, the limit function $F(x)$ =---------

0

The series of function $\sum_{k=1}^{\infty} f_k$ have a definite sum, if ----------

The sequence of partial sum of $\{f_k\}_j^{\infty}$ is convergent

Let $\sum_{n=0}^{\infty} a_n x^n$ be a power series with a radius of convergence $R > 0$, $f(x)$ is the sum of series on $(-R, R)$,then a_2 =----------

$\frac{f''(0)}{2}$

If $\{F_n\}_k^{\infty}$ converges pointwise to a function F on a subset S of D, we say that----------

$\sum_{j=k}^{\infty} f_j, \sum_{j=k}^{\infty} f_j$

If $\{F_n\}$ converges----------to F on S, we say that $\sum_{j=k}^{\infty} f_j$ converges----------

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Uniformly, uniformly

A sequence of function $\{F_n\}$ converges uniformly on a set S if and only if for each $\in > 0$ there is a natural number N such that----------

$$\|F_n - F_m\|_S < \in$$

The Taylor series of an infinitely many differentiable function ''f(x)''----------converges to ''f(x)''.

Always

For the series, $\frac{1}{3} - x + \frac{x^2}{3^2} - x^3 + \frac{x^4}{4} - z^5 + \ldots\ldots\ldots\ldots$, Limit Superior of $|a_n|^{\frac{1}{n}}$=----------

$\frac{1}{3}$

In the Schwarz's inequality; $|X.Y| \le |X||Y|, \forall X, Y$ in R^n, the equality hold for----------

All above are valid

For $x \in [-p, p] \subset (-1,1)$, while applying the Cauchy criteria on

$$S_k(x) = \sum_{j=0}^{\infty} x^j = \frac{1-x^{k+1}}{1-x}$$

Then for $m > n > N \Rightarrow |S_m - S_n|$----------

$$\le \frac{2p^{n+1}}{1-p}$$

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The method of testing the uniform convergence of the series $\sum f_j$ of function by definition is hard because----------

Finding the S_n (nth partial sum) in not always easy

Final Term

If f is bounded on a rectangle R, then

$$\overline{\int_R} f(X)dX \le \underline{\int_R} f(X)dX$$

If f is unbounded on the nondegenerate rectangle R in ,then

f is not integrable on R

A bounded f is integrable on a rectangle R if and only if

$$\overline{\int_R} f(X)dX = \underline{\int_R} f(X)dX$$

If value of a become zero in the Taylor series $\sum_{i=1}^{n} \frac{f^n(a)}{n!}(x-a)^n$,then the series is called

Maclaurin series

An absolutely convergent integral is always

convergent

If f is locally integrable on [a,b) and $\int_a^b |f(x)|dx < \infty, then \int_a^b f(x)\,dx\ is$

convergent

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The ------ of finitely many sets with zero content has zero content

union

A set of points of form $X - X_0 + tU, t_1 \le t \le t_2 is$ **called----**

line segment

------- is the only region in R

interval

For the function $f(x,y) = \frac{xy}{x^2+y^2}, the$ **limit of** $f(x,y)$ as $(x,y) \to (0,0)$ **along the line y=X is**

$\frac{1}{2}$

If f and g are continuous function at the point $X_0 in\ R^n\ then\ \frac{f}{g}$ **is continuous at** X_0 **provided that**

Answer

$g(X_0) \neq 0$

Suppose f is a continuous and $F(x) = \int_a^b f(t)\,dt$ **is bounded on [a,b) let** g' **be an**

$\int_a^b f(x)g(x)\,dx$ **converges**

An absolutely convergent integral is always

convergent

The lower integral $\int_{\bar{R}} f(x)\,dx$ **of f over R is the supremum of all the**

lower sums

A set is closed iff it contains all of its

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Limits point

----------surface in R^n has zero content

differentiable

If H is an open covering of a compact subset S

then S can be covered by atleast on set from it

The graph on an even function is symmetrical about

y-axis

The set of $\{(x,y), x^2+y^2 \le 1 \ or \ x^2+y^2 \ge 4\}$ is ----------in R^n since if is not connected.

Not a region

If f be the function of two variable the sum of finite number of continuousfunction is always a ------function

continuous

The greatest lower bounded of a set is called ---- of the set

infimum

A $f_{n1}, f_{n2} \to f_{n_n}$ exist on a neighborhood of X0 and are continuous at X0 the f is ----- at X0

differentiable

A function of several variable may have first order, order partial derivative at a pt.X0 but-----continuous at X0

fail to be

if $f(x) = 3x+5x^3$ then at $x=-1$ df =

none of these

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$h = f(x, y)$ $x = r\cos\theta$ and $y = r\sin\theta$ where then using chain rule $\frac{\partial h}{\partial r} = --- \cos\theta \frac{\partial f}{\partial x} + \sin\theta \frac{\partial f}{\partial y}$

The rate of change of f(x,y) in the direction of a unit vector is called the ----of f(x,y)

Directional derivative

A function of the form $L(X) = f_{x_1}(X_0)x_1 + f_{x_2}(X_0)x_2 + \ldots\ldots\ldots\ldots f_{x_n}(X_0)x_n$ **is called**

Differential of f at x0

if $h = f(x, y), x = f(r, \theta)$ and $y = f(r, \theta)$ *then u sin g the chain rule* $\frac{\partial h}{\partial \theta} = \ldots.$

$\frac{\partial f}{\partial x}\frac{\partial x}{\partial \theta} + \frac{\partial f}{\partial y}\frac{\partial y}{\partial \theta}$

A point on the graph of a function at which the tangent line is parallel to x-axis is called the ….

critical point

If p(X)is homogeneous polynomial of degree r in $X - X0.if \;\; p(X) \le 0$ for all $X \ne X_0$ **then p is called**

Negative semidefinite

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