MATHS

BOOKS - CHHAYA PUBLICATION MATHS (BENGALI ENGLISH)

CALCULUS

Wbhs Archive 2012

1. The value of $\frac{d}{dx}[x(x-1)(x-2)(x-3)]$ at x = 3 is -

A. 0

B. 3

C. 6

D. 24

Answer: B

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2. If $f(x) = |1 - 2x|$, then the value of f'(2) is -

A. 1

B. -2

C. 2

D. none of these

Answer: C

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3. $\lim_{x \to 1} \frac{x^3 - 1}{x^2 - 1} =$

A. $\frac{2}{3}$

B. $\frac{3}{2}$

C. 1

D. does not exists

Answer: B

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4. If $y = \sin^2 . \frac{x}{2}$, then $\frac{dy}{dx} =$

A. sin x

B. $\frac{1}{2}\sin x$

C. cos x

D. $\frac{1}{4}\sin x$

Answer: B

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5. If $f(x) = \frac{|x|}{x}(x \neq 0)$, then show that $\lim_{x \to 0} f(x)$ does not exists.

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6. If $f(x) = \frac{1}{x}(x \neq 0)$, then prove that $f'(a) = f'(-a)$, for any real values of a $(a \neq 0)$.

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7. Does $\lim_{x \to a} f(x) = \lim_{x \to a} g(x)$ always imply $f(x) = g(x)$? Justify your answer.

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8. if $f(x) = mx + c$ and $f(0) = f'(0) = 1$ then find the value of $f(3)$

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Wbhs Archive 2013

1. If $f(x) = x|x|$, prove that $f'(1) = 2$.

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2. Evaluate : $\lim_{x \to a} \frac{\sin\sqrt{x} - \sin\sqrt{a}}{x - a}$

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3. If a function f(x) is derivable at x = a, then show that

$$\lim_{x \to a} \frac{x^2 f(a) - a^2 f(x)}{2(x-a)} = af(a) - \frac{1}{2}\left(a^2 f'(a)\right)$$

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4. A function is defined as follows :

$$f(x) = \begin{cases} \frac{x^2}{2} & \text{when} \quad 0 \leq x < 1 \\ 2x^2 - 3x + \frac{3}{2} & \text{when} \quad 1 \leq x \leq 2 \end{cases}$$

Discuss the existence of f'(1).

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5. Evaluate : $\lim_{x \to -1} \frac{x+1}{4\sqrt{x+17} - 16}$

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Wbhs Archive 2014

1. If $y = \sin^2\left(\frac{x}{2}\right)$, then $\frac{dy}{dx}$ is-

A. sin x

B. $\frac{1}{2}\sin x$

C. cos x

D. $\frac{1}{2}\cos x$

Answer:

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2. If $\lim_{x \to 3} \frac{x^n - 3^n}{x - 3} = 27n$, then the value of n is -

A. 3

B. 2

C. 4

D. 5

Answer: C

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3. Define derivative of a function 'f' at x = c

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4. If $\lim_{x \to a} f(x) = \lim_{x \to a} g(x)$, then whether f(x) = g(x) is always true ? Justify your answer by an example.

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5. Evaluate : $\lim_{x \to 0} \frac{\sin(x^2 - x)}{x}$

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6. Find, from the first principle, the derivative of tan x at $x = \frac{\pi}{4}$.

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Wbhs Archive 2015

1. $\lim_{x \to 0} \frac{\sin \alpha x}{e^{\beta x} - 1} (\alpha, \beta \neq 0)$ equal to -

A. $\frac{\beta}{\alpha}$

B. 0

C. $\frac{\alpha}{\beta}$

D. limit does not exist

Answer: C

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2. If $f(x) = x|x|$, then the value of f'(-1) is -

A. 1

B. 2

C. -1

D. -2

Answer: B

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3. Prove that the derivative of an odd function is an even function.

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4. Evaluate: $\lim_{x \to y} \frac{\cos^2 x - \cos^2 y}{x^2 - y^2}$

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5. Prove that $\lim_{x \to 0} \frac{\log(1+x) + \sin x}{e^x - 1} = 2$

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6. find $f'(2)$where f(x)=$3x^2 + 2x$

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Wbhs Archive 2016

1. The value of $\lim_{x \to 0} \frac{\sin 5x}{\tan 3x}$ is

A. 2

B. 5

C. $\frac{5}{3}$

D. $\frac{3}{5}$

Answer: C

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2. If $y = \sqrt{\frac{1 - \cos 2x}{1 + \cos 2x}}$, then the value of $\frac{dy}{dx}$ will be

A. $\tan^2 x$

B. $\sec^2 x$

C. sec x

D. tan x

Answer:

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3. If $y = \frac{e^x}{1+x^2}$, determine $\frac{dy}{dx}$.

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4. Evaluate : $\lim_{x \to \frac{\pi}{4}} \frac{1 - \tan x}{x - \frac{\pi}{4}}$

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5. Evaluate : $\lim_{x \to 0} \frac{\cot 2x - \operatorname{cosec} 2x}{x}$

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6. Find the derivative of $f(x) = e^{x^2}$ at x = 1

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7. If $f(x) = ax^2 + bx + x$ and f(2) = 1, f(3) = 6, f(-1) = 10, then find the value of f'(1).

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Wbjee Archive 2013

1. The limit of $x \sin\left(\frac{1}{e^x}\right)$ as $x \to 0$

A. is equal to 0

B. is equal to 1

C. is equal to $\frac{e}{2}$

D. does not exists

Answer: A

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2. The limit of $\left\{\frac{1}{x}\sqrt{1+x} - \sqrt{1+\frac{1}{x^2}}\right.$ as $x \to 0$

A. does not exist

B. is equal to $\frac{1}{2}$

C. is equal to 0

D. is equal to 1

Answer: B

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Wbjee Archive 2014

1. If $\lim_{x \to 0} \frac{2a \sin x - \sin 2x}{\tan^3 x}$ exists and is equal to 1, then the value of a is -

A. 2

B. 1

C. 0

D. -1

Answer: B

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2. LEt $f(x)$ be a differentiable function and $f'(4) = 5$. Then, $\lim_{x \to 2} \frac{f(4) - f(x^2)}{x - 2}$ equals

A. 0

B. 5

C. 20

D. -20

Answer: D

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Wbjee Archive 2016

1. Let $f\mathbb{R} \to \mathbb{R}$ be differentiable at $x = 0$. If f(0) = 0 and f'(0) = 2, then the value of

$$\lim_{x \to 0} \frac{1}{x}[f(x) + f(2x) + f(3x) + \ldots + f(2015x)]$$ is

A. 2015

B. 0 (zero)

C. 2015×2016

D. 2015×2014

Answer: C

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2. Let,

$$x_n = \left(1 - \frac{1}{3}\right)^2 \left(1 - \frac{1}{6}\right)^2 \left(1 - \frac{1}{10}\right)^2 \ldots \left(1 - \frac{1}{\frac{n(n+1)}{2}}\right)^2, n \geq 2$$

Then the value of $\lim_{n \to \infty} {}_n$ is

A. $\frac{1}{3}$

B. $\frac{1}{9}$

C. $\frac{1}{81}$

D. 0 (zero)

Answer: B

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Jee Main Aieee Archive 2013

1. $\lim_{x \to 0} \frac{(1 - \cos 2x)(3 + \cos x)}{x \tan 4x}$ is equal to -

A. $-\frac{1}{4}$

B. $\frac{1}{2}$

C. 1

D. 2

Answer: D

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Jee Main Aieee Archive 2014

1. $\lim_{x \to 0} \frac{\sin(\pi \cos^2 x)}{x^2}$ is equal to -

A. $\frac{\pi}{2}$

B. 1

C. $-\pi$

D. π

Answer: D

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Jee Main Aieee Archive 2015

1. If the function

$$g(x) = \begin{cases} k\sqrt{x+1} & \text{when } 0 \leq x \leq 3 \\ mx+2 & \text{when } 3 < x \leq 5 \end{cases}$$

is differentiable, then the value of (k+m) is -

A. $\frac{10}{3}$

B. 4

C. 2

D. $\frac{16}{5}$

Answer: C

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Jee Advanced Archive 2014

1. The largest value of the non-negative integer a for which

$$\lim_{x \to 1} \left\{ \frac{-ax + \sin(x-1) + a}{x + \sin(x-1) - 1} \right\}^{\frac{1-x}{1-\sqrt{x}}} = \frac{1}{4}$$

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2. Let , $\alpha, \beta \in \mathbb{R}$ be such that $\lim_{x \to 0} \frac{x^2 \sin(\beta x)}{\alpha x - \sin x} = 1$. Then $6(\alpha + \beta)$ equals

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