



Mathematics Class – XII

Topic : Continuity and differentiability

Sub Topic : Continuity

Assignment : 1 (Objective questions)

Total Marks : 10

1). If $f(x) = \begin{cases} \frac{\sin 7x}{3x} & x \neq 0 \\ m & x = 0 \end{cases}$ is continuous at $x = 0$ then value of $m = ?$

a) $3/7$ b) $4/7$ c) $7/4$ d) $7/3$

2). The $f^n f(x) = \tan x$ is a discontinuous on set :

a) $\{n\pi, n \in \mathbb{Z}\}$ b) $\{2n\pi, n \in \mathbb{Z}\}$ c) $\{(2n+1)\frac{\pi}{2}, n \in \mathbb{Z}\}$ d) $\{\frac{n\pi}{2}, n \in \mathbb{Z}\}$

3). Which one is discontinuous at any point:

a) $\sin x$ b) $\cos x$ c) $\frac{1}{1-2x}$ d) $\frac{1}{1+x^2}$

4). If $f^n f(x) = \begin{cases} kx+1 & : x \leq 5 \\ 3x-5 & : x > 5 \end{cases}$ is continuous at $x=5$, then $K =$

a) $9/5$ b) $4/5$ c) $5/9$ d) 0

True/False:

5). The product of two continuous functions is continuous f^n

6). Every continuous function is differentiable.

7). If $f(x) = [x]$ whether $f(x)$ is continuous f^n at integral values.

Fill in the blanks:

8). If $f(x) = |x|$ then f^n is continuous at _____ points.

9). $|\sin x|$ is _____ at $x = \pi$ (discuss about continuity and differentiability)

10). Every polynomial is _____ function).

PREPARED BY :

Chander Kiran, Math Lecturer (G.S.S.S. Bal Kalan), Amritsar

Sarita Sharma, Math Lecturer (G.S.S.S. Nag Kalan), Amritsar



Mathematics Class – XII

Topic : Continuity and Differentiability

Assignment : 2 (Objective questions)

Total Marks : 10

- 1). If $f(x) = \sin x^2$ then $f'(x) =$
a) $2x \cos x^2$ b) $\cos x^2$ c) $-\cos x^2$ d) $2 (\cos x)^2$
- 2). If $y = \tan (3x + 8)$; then $y' =$
a) $(3x + 8) \tan x$ b) $3 \sec^2 (3x + 8)$ c) $\tan (3x + 8)$ d) 0
- 3). If $y = \cos \sqrt{x}$; then $\frac{dy}{dx} =$
a) $(\cos x)^{1/2}$ b) $\frac{-\sin \sqrt{x}}{2\sqrt{x}}$ c) $\frac{1}{2x} \cos x$ d) $\frac{\sqrt{x} \sin \sqrt{x}}{2}$

True False:

- 4). $\frac{d}{dx} (\cos^4 (x^3)) = -12 \cos^3 (x^3) \sin (x^3) x^2$
- 5). If $x^2 + y^2 = 25$ then $\frac{dy}{dx} = \frac{-x}{y}$
- 6). $y = \sqrt{\cot \sqrt{x}}$; then $y' = \frac{-\operatorname{cosec}^2(\sqrt{x})}{2\sqrt{\cot \sqrt{x}}}$
- 7). $\frac{d}{dx} (x^2 + 2x + 1)^2 = 2(x^2 + 2x + 1) (2x + 2)$
- 8). $\frac{d}{dx} \cos(\tan x) =$
- 9). If $x + y = e^7$ then find $\frac{dy}{dx} =$ _____
- 10). If $x + 2y = 3 \cos x$ then $\frac{dy}{dx} =$ _____

Prepared by :

Chander Kiran, Math Lecturer (G.S.S.S. Bal Kalan), Amritsar.

Sarita Sharma, Math Lecturer (G.S.S.S. Nag Kalan), Amritsar.



Mathematics Class – XII

Topic : Continuity and Differentiability

Sub Topic : Exponential f^n and logarithmic f^n

Assignment : 3 (Objective questions)

Total Marks : 10

- 1). If $f(x) = a^x$ ($a \in R^+$); $x \in R$ then domain of $f(x)$:
- a) $D_f = R$ b) $D_f = R^+$ c) $D_f = R - \{0\}$ d) $D_f = Q$
- 2). $y = (\sin x)^x$ then $\frac{dy}{dx}$
- a) $(\sin x)^x (x \cot x + \log(\sin x))$ b) $(\cos x)^x (\cot x + \log \cos x)$
- c) $x(\sin x)^{x-1}$ d) $(\sin x)^x \cos x$
- 3). $\frac{d}{dx} \log(\log(x)) =$
- a) $\frac{\log(\log(x))}{x \log x}$ b) $\frac{1}{x}$ c) $\frac{1}{x \log(x)}$ d) $\frac{\log x}{x}$

True False:

- 4). Logarithmic and exponential f^n are inverse of each other
- 5). $\log_e(1-x) = -x - \frac{x^2}{2} - \frac{x^3}{3} - \frac{x^4}{4} - \dots \infty$
- 6). $(\log_a b)(\log_b a) = 1$ T/F
- 7). $\frac{d}{dx} (x \log x - x) =$ _____
- 8). If $y = \cot^{-1}(e^x)$; then $\frac{dy}{dx} =$ _____
- 9). $\frac{d}{dx} \log_{10}(x^3) =$ _____
- 10). $\frac{d}{dx} \tan^{-1}(\sin^{-1}(a^x)) =$ _____

PREPARED BY :

Chander Kiran, Math Lecturer (G.S.S.S. Bal Kalan), Amritsar

Sarita Sharma, Math Lecturer (G.S.S.S. Nag Kalan), Amritsar



Mathematics Class – XII

Topic : Continuity and Differentiation

Sub Topic : Logarithmic function and inverse function differentiation

Assignment : 4 (Objective questions)
Total Marks : 10

- 1). If $y = (\log x)^x$ then $\frac{dy}{dx}$:
 a) $(\log x)^x [1 + \log x]$ b) $x(\log x)^{x-1}$ c) $(\log x)^{x-1}$ d) None of these
- 2). $\frac{d}{dx} \frac{8^x}{x^8}$:
 a) $x 8^{x-1}$ b) $\frac{8^x}{x^8} \left(\log 8 - \frac{8}{x} \right)$ c) $\frac{8^x \log 8}{x^8} - \frac{8^{x+1}}{x^9}$ d) None of these

True/False:

- 3). If the f^n is having a variable in the exponentials then differentiation can be done by taking log .
- 4). $\frac{d}{dx} a^x = a^x \log a$
- 5). If $y = x^x + x^a + a^x + a^a$ then $\frac{dy}{dx} = x^x (1 + \log x) + ax^{a-1} + a^x \log a$
- 6). If $y = (1+x)^x$ then $\frac{dy}{dx} = (1+x)^x \left[\frac{x}{1+x} + \log(1+x) \right]$
- 7). If $x = 2at^2$ & $y = at^4$ then find $\frac{dy}{dx}$
- 8). $e^x = 1 + \frac{x}{1!} + \frac{x^2}{2!} + \frac{x^3}{3!} + \dots \infty$
- 9). $\frac{d}{dx} \tan^{-1} x = \frac{1}{1+x^2}$
- 10). If $x = e^{\cos 2t}$ & $y = e^{\sin 2t}$ then $\frac{dy}{dx} + \frac{y}{x} \frac{\log x}{\log y} = 0$

PREPARED BY :

Chander Kiran, Math Lecturer (G.S.S.S. Bal Kalan), Amritsar

Sarita Sharma, Math Lecturer (G.S.S.S. Nag Kalan), Amritsar



Mathematics Class – XII

Topic : Continuity and Differentiability

Sub Topic : Inverse Trigonometric Function Differentiation

Assignment : 5 (Objective questions)
Total Marks : 10

- 1). If $\frac{d}{dx} (\sin^{-1}(\cos x)) :$
a) -1 b) 1 c) $\cos x$ d) $\sin x$
- 2). Derivative of $\tan^{-1} (\cot(3\pi - 2x))$ w.r.t. x
a) 3π b) 2 c) $\frac{1}{1+4x^2}$ d) 0
- 3). $\frac{d}{dx} (\sin^{-1}x + \cos^{-1}x)$
a) $\sin x$ b) 0 c) $\cos x$ d) $\sin(x + y)$
- 4). $\frac{d}{dx} (\sec^{-1}x) + \frac{d}{dy} (\sin^{-1}y)$
a) $\frac{1}{\sqrt{1-x^2}}$ b) $\frac{1}{|x|\sqrt{1-x^2}} + \frac{1}{\sqrt{y^2-1}}$ c) $\frac{1}{|x|\sqrt{x^2-1}} + \frac{1}{\sqrt{1-y^2}}$ d) 0
- 5). $\frac{d}{dx} (e^{\sin^{-1}x})$
a) $\frac{1}{\sqrt{1+x^2}} e^{\cos^{-1}x}$ b) $\frac{-1}{\sqrt{1-x^2}} e^{\sin^{-1}x}$ c) $\frac{1}{\sqrt{1-x^2}} e^{\sin^{-1}x}$ d) 0
- 6). $\frac{dy}{dx} = \text{-----}$; if $\tan^{-1}(x^2 + y^2) = a$
- 7). If $y = \cos^{-1} \frac{2x}{1+x^2}$: $\frac{dy}{dx} = \text{-----}$
- 8). If $y = \tan^{-1}(e^x)$ then $\frac{dy}{dx} = \text{-----}$

True/False:

- 9). If $y = x \sec^{-1} x$ then $\frac{dy}{dx} = \frac{-1}{x^2-1} + \sec^{-1}(x)$
- 10.) $\left(\frac{d}{dx} \tan^{-1} x\right)$ is always greater than 0.

PREPARED BY :

Chander Kiran, Math Lecturer (G.S.S.S. Bal Kalan), Amritsar

Sarita Sharma, Math Lecturer (G.S.S.S. Nag Kalan), Amritsar



Mathematics Class – XII

Topic : Continuity and Differentiability

Sub Topic : Derivative of 2nd Order

Assignment : 6 (Objective questions)

Total Marks : 10

- 1). If $y = \log x$, then $\frac{d^2y}{dx^2} =$
 a) $\frac{1}{x}$ b) $\frac{-1}{x^2}$ c) $\frac{-1}{x}$ d) $\frac{1}{x^2}$
- 2). If $y = 9x^2$; $y_2(5) =$
 a) 18 b) $18x$ c) 90 d) 0
- 3). $\frac{d^2y}{dx^2}$ if $y = x \cos x$
 a) $x \cos x + 2 \sin x$ b) $-x \cos x - 2 \sin x$ c) $x \sin x + 2 \cos x$
 d) $-x \sin x - 2 \cos x$
- 4). If $y = \tan^{-1}x$; then $y'' =$
 a) $\frac{1}{1+x^2}$ b) $\frac{-2x}{(1+x^2)^2}$ c) $\frac{2}{(1+x^2)^2}$ d) $\frac{2}{(1+x)^2}$

True/False:

- 5). If $y = e^{x \sin x}$; then $\frac{d^2y}{dx^2} = e^{x \sin x} \left(\frac{-x \sin x + 2 \cos x}{+(x \cos x + \sin x)} \right)$
- 6). Second order derivative of x^{20} is $20x^{19}$

Fill in the blanks:

- 7). If $y = \cos^{-1}x$ then $\frac{d^2y}{dx^2}$ (in terms of y) = -----
- 8). $y = a^x + x^a$ then $y'' =$ -----
- 9). $y = 3x^3 + 6x^2 + 6x + 3$ $\frac{d^2y}{dx^2} =$ -----
- 10). $y = a(\sin x) + a(\cos x)$ then $\frac{d^2y}{dx^2}$ (in terms of y) = -----

PREPARED BY :

Chander Kiran, Math Lecturer (G.S.S.S. Bal Kalan), Amritsar

Sarita Sharma, Math Lecturer (G.S.S.S. Nag Kalan), Amritsar

ANSWER KEY

ASSIGNMENT 1

1. d 2. c 3. c 4. a 5. T 6. F 7. F 8. All 9. Continuous
10. Continuous

ASSIGNMENT 2

1. a 2. b 3. b 4. T 5. T 6. F 7. T 8. $-\sin(\tan x) \cdot \sec^2 x$
9. -1 10. $\frac{-3\sin x - 1}{2}$

ASSIGNMENT 3

1. a 2. a 3. c 4. T 5. T 6. T 7. $\log_e x$ 8. $\frac{-e^x}{1+e^{2x}}$ 9. $\frac{3}{x}$
10. $\frac{1}{1+(\sin^{-1}(a^x))^2} \cdot \frac{a^x \log a}{\sqrt{1-a^{2x}}}$

ASSIGNMENT 4

1. d 2. b 3. T 4. T 5. T 6. T 7. t^2 8. T 9. T
10. T

ASSIGNMENT 5

1. a 2. b 3. b 4. c 5. c 6. $-\frac{x}{y}$ 7. $\frac{2}{1+x^2}$ 8. $\frac{e^x}{1+e^{2x}}$
9. F 10. T

ASSIGNMENT 6

1. b 2. a 3. b 4. b 5. T 6. F 7. $-\cot y \csc^2 y$
8. $a^x(\log a)^2 + (a^2 - a)x^{a-2}$ 9. $18x + 12$ 10. $-y$