

Chapter 04 **DIFFERENTIABILITY**

1) Let f be a real value function and $x \in D_f$ then the limit $\lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ when it exists is called

- A) The derivative of f at a
- B) The derivative of f at h
- C) The derivative of f at x
- D) The derivative of f at $x = h$

Answer: C

2) The value of the limit $\lim_{x \rightarrow a} \frac{x^7 - a^7}{x - a}$ is equal to

- A) 0
- B) $0/0$
- C) $7a^7$
- D) $7a^6$

Answer: D

3) The derivative of $\frac{ax+b}{cx+d}$ w.r.t $\frac{ax+b}{cx+d}$ is

- A) $\frac{b}{(cx+d)^2}$
- B) $\frac{a}{(cx+d)^2}$
- C) 1
- D) 0

Answer: C

4) The slope of the tangent to the curve $y = x^3 + 5$ at the point $(1, 2)$ is

- A) 6
- B) 2
- C) 5
- D) 3

Answer: D

5) If $x = 2t$, $y = t^2$ then $\frac{dy}{dx}$ is equal to

- A) $4t$
- B) 2
- C) t
- D) 4

Answer: C

6) If a particle moves according to the law $x = 16t - 4$ then acceleration at time $t = 20$ is

- A) 6
- B) 0
- C) 116

D) 4

Answer: B

7) If a particle moves according to the law $x = e^t$ then velocity at time $t = 0$ is

- A) 0
- B) 1
- C) e
- D) none of these

Answer: B

Differentiation of Trigonometric, Logarithmic and Exponential Function

1) The derivative of $\sin(a+b)$ w.r.t x is

- A) $\cos(a+b)$
- B) $-\cos(a+b)$
- C) $\cos(a-b)$
- D) 0

Answer: D

2) The derivative of $x \sin a$ w.r.t x is

- A) $\cos a$
- B) $x \cos a + \sin a$
- C) $-x \cos a + \sin a$
- D) $\sin a$

Answer: D

3) The derivative of $\frac{x+a}{\sin a}$ w.r.t x is

- A) $\frac{\sin a - (x+a) \cos a}{(\sin a)^2}$
- B) $\frac{\sin a - \cos a}{\sin^2 a}$
- C) $\frac{\sin a - x - a}{\sin^2 a}$
- D) $\frac{1}{\sin a}$

Answer: D

4) The derivative of $\frac{\sin a}{\cos a}$ w.r.t x is

- A) $\sec^2(ax+b)$
- B) $\frac{\cos a}{\sin a}$
- C) $\frac{-\cos a}{\sin a}$
- D) 0

Answer: D

5) The derivative of $\tan(ax+b)$ w.r.t $\tan(ax+b)$ is

- A) $\sec^2(ax+b)$
- B) $a \sec^2(ax+b)$

- C) $b \sec^2(ax + b)$
 D) 1

Answer: D

6) If $x = 2\cos^7\theta$, $y = 4\sin^7\theta$ then dy/dx is equal to

- A) $4\tan^7\theta$
 B) $-4\tan^7\theta$
 C) $4\tan^5\theta$
 D) $-2\tan^5\theta$

Answer: D

7) The derivative of $(\sec^{-1}x + \operatorname{cosec}^{-1}x)$ is equal to

- A) $\frac{1}{x\sqrt{x^2-1}}$
 B) $\frac{1}{1+a^2}$
 C) 0
 D) $\frac{1}{\sqrt{x^2-1}} - \frac{1}{\sqrt{x^2+1}}$

Answer: C

8) The derivative of $\sin^{-1}a + \tan^{-1}a$ w.r.t x is equal to

- A) $\frac{1}{\sqrt{1-a^2}}$
 B) $\frac{1}{1+a^2}$
 C) $\frac{1}{\sqrt{1-a^2}} + \frac{1}{1+a^2}$
 D) 0

Answer: D

9) The value of e as sum of the series is

- A) $1 + \frac{1}{2} + \frac{1}{3} + \dots$
 B) $1 + 2 + \frac{1}{3} + \dots$
 C) $1 + \frac{1}{1!} + \frac{1}{2!} + \frac{1}{3!} + \dots$
 D) $1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \dots$

Answer: C

10) The base of the natural logarithmic function is

- A) 10
 B) 2
 C) e
 D) none of these

Answer: C

11) The natural exponential function is defined by the equation

- A) $y = a^x$
 B) $y = 2^x$
 C) $y = e^x$
 D) $y = 3^x$

Answer: C

12) The derivative of $\sin(\sin a)$ w.r.t x is

- A) $\cos(\sin a)$
 B) $\cos(\sin a) \cos a$
 C) $\cos(\cos a)$
 D) 0

Answer: D

13) If $a^y = x$ then the value of y is

- A) ax
 B) $\log_a x$
 C) x/a
 D) a/x

Answer: B

14) If $\frac{y}{x} = \tan^{-1} \frac{x}{y}$ then $\frac{dy}{dx}$ is

- A) xy
 B) $\frac{1}{x^2 + y^2}$
 C) $\frac{1}{1 + y^2}$
 D) $\frac{y}{x}$

Answer: D

15) The derivative of $\exp(\sin x)$ is

- A) $\exp(\cos x)$
 B) $\sin x \exp(\cos x)$
 C) $(\cos x) \exp(\sin x)$
 D) $\cos x \exp(\cos x)$

Answer: C

16) The derivative of e^2 w.r.t x is

- A) $2e$
 B) 2
 C) 1
 D) 0

Answer: D

17) The derivative of X^X is

- A) X^{x-1}
 B) $X \cdot X^{x-1}$
 C) $X^x (1 + \ln x)$
 D) $X^x \ln x$

Answer: C

18) If δx or dx is quite small then the difference between dy and δy will be

- A) very large
- B) large
- C) small
- D) negligible

Answer: D

19) The derivative of the function $y = \tan x$ is

- A) $\tan x \sec^2 45^\circ + \sec^2 x \tan 45^\circ$
- B) $\sec^2 x \sec^2 45^\circ$
- C) $\sec^2 45^\circ$
- D) $\sec^2 x$

Answer: D

20) the derivative of the function $f(x) = \sin x + \sin x + \dots$ Up to 9 times, is

- A) $\cos x + \cos x + \cos x$
- B) $9 \cos x$
- C) $9 \sin x$
- D) $3 \cos x$

Answer: B

21) The derivative of the function $f(x) = \frac{1}{\cos ecx}$ is

- A) $\sec^2 45^\circ \cos x$
- B) $\sec^2 45^\circ \sin x$
- C) $-\operatorname{Cosec}^2 45^\circ \cot x$
- D) $\cos x$

Answer: D