

CHAPTER 5

CONTINUITY AND DIFFERENTIABILITY

Assertion Reason Questions

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	Assertion Reason Questions
1.	Assertion:- If $y = \sin^{-1}(6x\sqrt{1-9x^2})$, then $\frac{dy}{dx} = \frac{6}{\sqrt{1-9x^2}}$ Reason:- $\sin^{-1}(6x\sqrt{1-9x^2}) = 3 \sin^{-1} 2x$
	(A) Both Assertion and reason are true and reason is correct explanation of assertion. (B) Assertion and reason both are true but reason is not the correct explanation of assertion. (C) Assertion is true, reason is false. (D) Assertion is false, reason is true.
2.	Assertion:- If $y = \log_{10}x + \log_e y$, then $\frac{dy}{dx} = \frac{\log_e 10}{x} \left(\frac{y}{y-1}\right)$ Reason:- $\frac{d}{dx}(\log_e x) = \frac{\log x}{\log e}$
	(A) Both Assertion and reason are true and reason is correct explanation of assertion. (B) Assertion and reason both are true but reason is not the correct explanation of assertion. (C) Assertion is true, reason is false. (D) Assertion is false, reason is true.
3.	Assertion:- If $x = at^2$ and $y = 2at$ then $\left. \frac{d^2y}{dx^2} \right _{t=2} = \frac{-1}{16a}$ Reason:- $\frac{d^2y}{dx^2} = \left(\frac{dy}{dx}\right)^2 \times \left(\frac{dt}{dx}\right)^2$
	(A) Both Assertion and reason are true and reason is correct explanation of assertion. (B) Assertion and reason both are true but reason is not the correct explanation of assertion. (C) Assertion is true, reason is false. (D) Assertion is false, reason is true.
4.	Assertion:- $\frac{d}{dx}(e^{\cos x}) = e^{\cos x}(-\sin x)$ Reason:- $\frac{d}{dx}(e^x) = e^x$
	(A) Both Assertion and reason are true and reason is correct explanation of assertion. (B) Assertion and reason both are true but reason is not the correct explanation of assertion. (C) Assertion is true, reason is false. (D) Assertion is false, reason is true.
5.	Assertion:- If $xy = e^{x-y}$ then $\frac{dy}{dx} = \frac{y(x-1)}{x(1+y)}$ Reason:- $\frac{d}{dx}(uv) = u \frac{dv}{dx} + v \frac{du}{dx}$

	<p>(A) Both Assertion and reason are true and reason is correct explanation of assertion.</p> <p>(B) Assertion and reason both are true but reason is not the correct explanation of assertion.</p> <p>(C) Assertion is true, reason is false.</p> <p>(D) Assertion is false, reason is true.</p>
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6	<p>Assertion: $\frac{de^{-x}}{dx} = -e^{-x}$</p> <p>Reason: $\frac{de^x}{dx} = e^x$</p> <p>(A) Both Assertion and reason are true and reason is correct explanation of assertion</p> <p>(B) Assertion and reason both are true but reason is not correct explanation of assertion</p> <p>(C) Assertion is true, reason is false</p> <p>(D) Assertion is false, reason is true</p>
7	<p>Assertion: If $x = a(\theta + \sin \theta)$, $y = a(1 - \cos \theta)$ then $\frac{dy}{dx} = \tan \frac{\theta}{2}$</p> <p>Reason: $x = f(\theta), y = g(\theta)$ then $\frac{dy}{dx} = \frac{\frac{dy}{d\theta}}{\frac{dx}{d\theta}}$</p> <p>(A) Both Assertion and reason are true and reason is correct explanation of assertion</p> <p>(B) Assertion and reason both are true but reason is not correct explanation of assertion</p> <p>(C) Assertion is true, reason is false</p> <p>(D) Assertion is false, reason is true</p>
8	<p>Assertion: If $y = A \sin x + B \cos x$ then $\frac{d^2y}{dx^2} + y = 0$</p> <p>Reason: $\frac{d^2y}{dx^2} = \frac{d(dy)}{dx(dx)}$</p> <p>(A) Both Assertion and reason are true and reason is correct explanation of assertion</p> <p>(B) Assertion and reason both are true but reason is not correct explanation of assertion</p> <p>(C) Assertion is true, reason is false</p> <p>(D) Assertion is false, reason is true</p>
9	<p>Assertion: $\frac{da^x}{dx} = a^x \log a$</p> <p>Reason: $\frac{de^x}{dx} = e^x$</p> <p>(A) Both Assertion and reason are true and reason is correct explanation of assertion</p> <p>(B) Assertion and reason both are true but reason is not correct explanation of assertion</p> <p>(C) Assertion is true, reason is false</p> <p>(D) Assertion is false, reason is true</p>
10	<p>Assertion: If $x^{\frac{2}{3}} + y^{\frac{2}{3}} = a^{\frac{2}{3}}$ then $\frac{dy}{dx} = -\sqrt[3]{\frac{y}{x}}$</p> <p>Reason: $x = a \cos^3 \theta, y = a \sin^3 \theta$ $\frac{dy}{dx} = \frac{\frac{dy}{d\theta}}{\frac{dx}{d\theta}}$</p> <p>(A) Both Assertion and reason are true and reason is correct explanation of assertion</p> <p>(B) Assertion and reason both are true but reason is not correct explanation of assertion</p> <p>(C) Assertion is true, reason is false</p> <p>(D) Assertion is false, reason is true</p>

11	<p>Assertion : If $x = at^2$ and $y = 2at$ then $\frac{d^2y}{dx^2}$ is $-\frac{1}{2at^3}$.</p> <p>Reason : $\frac{dx}{dt} = 2at, \frac{dy}{dt} = 2a$</p> <p>(A) Both Assertion and reason are true and reason is correct explanation of assertion</p>
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	<p>(B) Assertion and reason both are true but reason is not correct explanation of assertion (C) Assertion is true, reason is false (D) Assertion is false, reason is true</p>
12	<p>Assertion: If $x = a \cos^3 A$, $y = a \sin^3 A$ then $\frac{d^2y}{dx^2}$ is $\frac{32}{27a}$. Reason: $\frac{dx}{dA} = -3a \cos^2 A$ and $\frac{dy}{dA} = 3a \sin^2 A$ (A) Both Assertion and reason are true and reason is correct explanation of assertion (B) Assertion and reason both are true but reason is not correct explanation of assertion (C) Assertion is true, reason is false (D) Assertion is false, reason is true</p>
13	<p>Assertion: $\frac{d}{dx}(e^{2x}) = 2e^{2x}$. Reason: $\frac{d}{dx}(e^x) = e^x$ and $\frac{d}{dx}(2x) = 2$ (A) Both Assertion and reason are true and reason is correct explanation of assertion (B) Assertion and reason both are true but reason is not correct explanation of assertion (C) Assertion is true, reason is false (D) Assertion is false, reason is true</p>
14	<p>Assertion: $\frac{d}{dx}(5^x) = 5^x \log_e 5$. Reason: $\frac{d}{dx}(x^n) = n x^{n-1}$. (A) Both Assertion and reason are true and reason is correct explanation of assertion (B) Assertion and reason both are true but reason is not correct explanation of assertion (C) Assertion is true, reason is false (D) Assertion is false, reason is true</p>
15	<p>Assertion: If $x^2 + 2xy + y^3 = 42$, then $\frac{dy}{dx} = \frac{-2(x+y)}{(2x+3y^2)}$. Reason: $\frac{d}{dx}(x^n) = n x^{n-1}$, $\frac{d}{dx}(x y) = x \frac{dy}{dx} + y$ and $\frac{d}{dx}(y^n) = n y^{n-1} \frac{dy}{dx}$. (A) Both Assertion and reason are true and reason is correct explanation of assertion (B) Assertion and reason both are true but reason is not correct explanation of assertion (C) Assertion is true, reason is false (D) Assertion is false, reason is true</p>
16	<p>ASSERTION(A): If $y = e^{\log x}$, then $\frac{dy}{dx} = 1$ REASON(R): $e^{\log x} = x$. Hence $\frac{dy}{dx} = 1$ (A) Both Assertion and reason are true and reason is correct explanation of assertion (B) Assertion and reason both are true but reason is not correct explanation of assertion (C) Assertion is true, reason is false (D) Assertion is false, reason is true</p>
17	<p>ASSERTION(A): If $y = \log_{10}(x^2 + x)$, then $\frac{dy}{dx} = \frac{2x+1}{x^2+x} \times \log_{10} e$ REASON(R): $\log_{10} a = \log_e a \times \log_{10} e$ (A) Both Assertion and reason are true and reason is correct explanation of assertion (B) Assertion and reason both are true but reason is not correct explanation of assertion (C) Assertion is true, reason is false (D) Assertion is false, reason is true</p>
18	<p>ASSERTION(A): Derivative of $e^{\cos x}$ with respect to y is $e^{\cos x} \times (-\sin x)$ REASON(R): $\frac{du}{dy} = \frac{du}{dx} \times \frac{dx}{dy}$ (A) Both Assertion and reason are true and reason is correct explanation of assertion</p>

	<p>(B) Assertion and reason both are true but reason is not correct explanation of assertion (C) Assertion is true, reason is false (D)Assertion is false, reason is true</p>
19.	<p>ASSERTION(A): If $x = a \cos \theta$, $y = a \sin \theta$, then $\frac{d^2y}{dx^2} = -\frac{1}{a} \operatorname{cosec}^3 \theta$</p> <p>REASON(R) : $\frac{d^2y}{dx^2} = \frac{d^2y}{d\theta^2} \times \frac{d\theta^2}{dx^2}$</p> <p>(A)Both Assertion and reason are true and reason is correct explanation of assertion (B) Assertion and reason both are true but reason is not correct explanation of assertion (C) Assertion is true, reason is false (D)Assertion is false, reason is true</p>
20	<p>ASSERTION(A): $\frac{d}{dx}(x^{\sin x}) = x^{\sin x} \left[\cos x \log x + \frac{\sin x}{x} \right]$</p> <p>REASON(R) : If $y = x^{f(x)}$ then $\frac{dy}{dx} = x^{f(x)} \left[f'(x) \log x + \frac{\sin x}{x} \right]$</p> <p>(A)Both Assertion and reason are true and reason is correct explanation of assertion (B) Assertion and reason both are true but reason is not correct explanation of assertion (C) Assertion is true, reason is false (D)Assertion is false, reason is true</p>
21	<p>Assertion (A): $\sin x$ is continuous for all $x \in \mathbb{R}$.</p> <p>Reason (R) : $\sin x$ and x are continuous in \mathbb{R}.</p> <p>(A)Both Assertion and reason are true and reason is correct explanation of assertion (B) Assertion and reason both are true but reason is not correct explanation of assertion (C) Assertion is true, reason is false (D)Assertion is false, reason is true</p>
22	<p>Consider the function $f(x) = \begin{cases} \frac{kx}{ x }, & \text{if } x < 0 \\ 3, & \text{if } x \geq 0 \end{cases}$ which is continuous at $x = 0$.</p> <p>Assertion (A) : The value of k is -3.</p> <p>Reason (R) : $x = \begin{cases} -x, & \text{if } x < 0 \\ x, & \text{if } x \geq 0 \end{cases}$</p> <p>(A)Both Assertion and reason are true and reason is correct explanation of assertion (B) Assertion and reason both are true but reason is not correct explanation of assertion (C) Assertion is true, reason is false (D)Assertion is false, reason is true</p>
23	<p>Assertion (A) : $\sin x$ is continuous at $x = 0$.</p> <p>Reason (R) : $\sin x$ is differentiable at $x = 0$.</p> <p>(A)Both Assertion and reason are true and reason is correct explanation of assertion (B) Assertion and reason both are true but reason is not correct explanation of assertion (C) Assertion is true, reason is false (D)Assertion is false, reason is true</p>

24	<p>Let $f(x) = [x - 1] + x - 2$ where $[\]$ denotes the greatest integer function and $\$ denotes the modulus function.</p> <p>Assertion (A) : $f(x)$ is discontinuous at $x = 2'$</p> <p>Reason (R) : $f(x)$ is non - derivable at $x = 2$.</p> <p>(A)Both Assertion and reason are true and reason is correct explanation of assertion (B) Assertion and reason both are true but reason is not correct explanation of assertion (C) Assertion is true, reason is false (D)Assertion is false, reason is true</p>
25	<p>Assertion (A) : $\frac{d}{dx} (e^{\sin x}) = e^{\sin x} (\cos x)$.</p> <p>Reason (R) : $\frac{d}{dx} (e^x) = e^x$.</p> <p>(A)Both Assertion and reason are true and reason is correct explanation of assertion (B) Assertion and reason both are true but reason is not correct explanation of assertion (C) Assertion is true, reason is false (D)Assertion is false, reason is true</p>
26	<p>Assertion:- $\frac{d}{dx} (\log x) = \frac{1}{x}$</p> <p>Reason:- $x = -x, x < 0$</p> <p>(A)Both Assertion and reason are true and reason is correct explanation of assertion (B) Assertion and reason both are true but reason is not correct explanation of assertion (C) Assertion is true, reason is false (D)Assertion is false, reason is true</p>
27	<p>Assertion:- If $x = at^2$ and $y = 2at$, then $\frac{dy}{dx} = \frac{1}{t}$</p> <p>Reason:- $\frac{d}{dx} \left(\frac{f(x)}{g(x)} \right) = \frac{f'(x)}{g'(x)}$</p> <p>(A) Both Assertion and reason are true and reason is correct explanation of assertion. (B) Assertion and reason both are true but reason is not the correct explanation of assertion. (C) Assertion is true, reason is false. (D) Assertion is false, reason is true.</p>
28	<p>Assertion:- If $y = \log \sin x$, then $\frac{dy}{dx} = \cot x$</p> <p>Reason:- $y = f(x)$ and $x = g(t)$, then $\frac{dy}{dx} = \frac{dy}{dt} \cdot \frac{dt}{dx}$</p> <p>(A) Both Assertion and reason are true and reason is correct explanation of assertion. (B) Assertion and reason both are true but reason is not the correct explanation of assertion. (C) Assertion is true, reason is false. (D) Assertion is false, reason is true.</p>
29	<p>Assertion:- If $y = \sin^{-1}(2x\sqrt{1-x^2})$, then $\frac{dy}{dx} = \frac{2}{\sqrt{1-x^2}}$</p> <p>Reason:- $\sin^{-1}(2x\sqrt{1-x^2}) = 2 \sin^{-1} x$</p> <p>(A) Both Assertion and reason are true and reason is correct explanation of assertion.</p>

	<p>(B) Assertion and reason both are true but reason is not the correct explanation of assertion.</p> <p>(C) Assertion is true, reason is false.</p> <p>(D) Assertion is false, reason is true.</p>
30	<p>Assertion:- If $y = \sqrt{a^{\cos^{-1}t}}$ and $x = \sqrt{a^{\sin^{-1}t}}$, then $\frac{dy}{dx} = -\frac{y}{x}$</p> <p>Reason:- we know that $\frac{d}{dx}(x^n) = nx^{n-1}$</p> <p>(A) Both Assertion and reason are true and reason is correct explanation of assertion.</p> <p>(B) Assertion and reason both are true but reason is not the correct explanation of assertion.</p> <p>(C) Assertion is true, reason is false.</p> <p>(D) Assertion is false, reason is true.</p>
31	<p>Assertion : $\frac{d}{dx}(e^{\sin x}) = e^{\sin x} \cdot \cos x$</p> <p>Reason : $\frac{d}{dx}(e^x) = e^x$</p> <p>(A) Both Assertion and reason are true and reason is correct explanation of assertion</p> <p>(B) Assertion and reason both are true but reason is not correct explanation of assertion</p> <p>(C) Assertion is true, reason is false</p> <p>(D) Assertion is false, reason is true</p>
32	<p>Assertion: $\frac{d}{dx}(\sqrt{e^{\sqrt{x}}}) = \frac{e^{\sqrt{x}}}{4\sqrt{x}e^{\sqrt{x}}}$</p> <p>Reason: $\frac{d}{dx}[\log(\log(x))] = \frac{1}{x \log x}, x > 1$</p> <p>(A) Both Assertion and reason are true and reason is correct explanation of assertion</p> <p>(B) Assertion and reason both are true but reason is not correct explanation of assertion</p> <p>(C) Assertion is true, reason is false</p> <p>(D) Assertion is false, reason is true</p>
33	<p>Assertion: If $f(x) = \log x$, then $f''(x) = -\frac{1}{x^2}$</p> <p>Reason: If $y = x^3 \log x$, then $\frac{d^2y}{dx^2} = x(5 + 6 \log x)$</p> <p>(A) Both Assertion and reason are true and reason is correct explanation of assertion</p> <p>(B) Assertion and reason both are true but reason is not correct explanation of assertion</p> <p>(C) Assertion is true, reason is false</p> <p>(D) Assertion is false, reason is true</p>
34	<p>Assertion: Derivative of x^x with respect to x is $x^x(1 + \log x)$</p> <p>Reason: Assertion not true, as derivative of x^x with respect to x is xx^{x-1}.</p> <p>(A) Both Assertion and reason are true and reason is correct explanation of assertion</p> <p>(B) Assertion and reason both are true but reason is not correct explanation of assertion</p> <p>(C) Assertion is true, reason is false</p>

	(D)Assertion is false, reason is true
35	<p>Assertion: If $\sin(x + y) = \log_e(x + y)$, then $\frac{dy}{dx} = -1$.</p> <p>Reason: The derivative of an odd function is always an even function.</p> <p>(A)Both Assertion and reason are true and reason is correct explanation of assertion (B) Assertion and reason both are true but reason is not correct explanation of assertion (C) Assertion is true, reason is false (D)Assertion is false, reason is true</p>
36	<p>Assertion (A): If $f(x).g(x)$ is continuous at $x=a$, then $f(x)$and $g(x)$are separately continuous at $x=a$</p> <p>Reason (R): Any function $f(x)$ said to continuous at $x=a$, if $\lim_{h \rightarrow 0} f(a+h)=f(a)$</p> <p>(A)Both Assertion and reason are true and reason is correct explanation of assertion (B) Assertion and reason both are true but reason is not correct explanation of assertion (C) Assertion is true, reason is false (D)Assertion is false, reason is true</p>
37	<p>Assertion (A): If $f(x)$and $g(x)$ are two continuous such that $f(0)=3$, $g(0)=2$, then $\lim_{x \rightarrow 0} \{f(x)+g(x)\}=5$.</p> <p>Reason (R): If $f(x)$ and $g(x)$ are two continuous function at $x=a$ then $\lim_{x \rightarrow a} \{f(x) + g(x)\} = \lim_{x \rightarrow a} f(x) + \lim_{x \rightarrow a} g(x)$.</p> <p>(A)Both Assertion and reason are true and reason is correct explanation of assertion (B) Assertion and reason both are true but reason is not correct explanation of assertion (C) Assertion is true, reason is false (D)Assertion is false, reason is true</p>
38	<p>Assertion (A): $\sin x$ is a continuous function .</p> <p>Reason (R): if $f(x)$ and $g(x)$ both are continuous functions, then $gof(x)$ is also a continuous function.</p> <p>(A)Both Assertion and reason are true and reason is correct explanation of assertion (B) Assertion and reason both are true but reason is not correct explanation of assertion (C) Assertion is true, reason is false (D)Assertion is false, reason is true</p>
39	<p>Assertion (A): if $y=\sin x$, then $\frac{d^3y}{dx^3}=-1$ at $x=0$.</p> <p>Reason (R): if $y=f(x).g(x)$, then $\frac{dy}{dx} = f(x).\frac{d}{dx}g(x)+g(x)\frac{d}{dx}f(x)$.</p> <p>(A)Both Assertion and reason are true and reason is correct explanation of assertion (B) Assertion and reason both are true but reason is not correct explanation of assertion (C) Assertion is true, reason is false (D)Assertion is false, reason is true</p>
40	Assertion (A): If $f(x)=\sin x^2$ $f'(x)= 2x.\cos x^2$

	<p>Reason : $f=c$ when the given function is function of function then $\frac{dy}{dx} = \frac{dy}{dx} \cdot \frac{dy}{dx}$</p> <p>(A) Both Assertion and reason are true and reason is correct explanation of assertion (B) Assertion and reason both are true but reason is not correct explanation of assertion (C) Assertion is true, reason is false (D) Assertion is false, reason is true</p>
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ANSWER KEY

QUESTION	ANSWER	QUESTION	ANSWER
1	C	21	A
2	C	22	A
3	C	23	C
4	B	24	B
5	B	25	A
6	B	26	A
7	A	27	A
8	A	28	A
9	B	29	B
10	A	30	B
11	A	31	A
12	C	32	B
13	A	33	B
14	B	34	C
15	A	35	B
16	A	36	D
17	B	37	A
18	D	38	A
19	C	39	B
20	A	40	A

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