

1) If $f(x)$ is a differentiable function, then $f'(x) =$

☐ $\lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$

☐ $\lim_{x \rightarrow 0} \frac{f(x+h) + f(x)}{h}$

☐ $\lim_{h \rightarrow 0} \frac{f(x+h) + f(x)}{h}$

☐ $\lim_{x \rightarrow 0} \frac{f(x+h) - f(x)}{h}$

2) If $f(x) = 4x^2$, then $f'(x) =$

☐ $\lim_{x \rightarrow 0} \frac{4(x+h)^2 - (4x^2)}{h}$

☐ $\lim_{x \rightarrow 0} \frac{4(x+h)^2 + (4x^2)}{h}$

☐ $\lim_{h \rightarrow 0} \frac{4(x+h)^2 + (4x^2)}{h}$

☐ $\lim_{h \rightarrow 0} \frac{4(x+h)^2 - (4x^2)}{h}$

3) If $f(x) = x^2 - 3$, then $f'(x) =$

☐ $\lim_{x \rightarrow 0} \frac{[(x+h)^2 - 3] - [x^2 - 3]}{h}$

☐ $\lim_{x \rightarrow 0} \frac{[(x+h)^2 - 3] + [x^2 - 3]}{h}$

☐ $\lim_{h \rightarrow 0} \frac{[(x+h)^2 - 3] - [x^2 - 3]}{h}$

☐ $\lim_{h \rightarrow 0} \frac{[(x+h)^2 - 3] + [x^2 - 3]}{h}$

4) If $f(x) = \sqrt{x}$, $x \geq 0$, then $f'(x) =$

☐ $\lim_{x \rightarrow 0} \frac{\sqrt{x+h} - \sqrt{x}}{h}$

☐ $\lim_{h \rightarrow 0} \frac{\sqrt{x+h} + \sqrt{x}}{h}$

☐ $\lim_{h \rightarrow 0} \frac{\sqrt{x+h} + \sqrt{x}}{h}$

☐ $\lim_{x \rightarrow 0} \frac{\sqrt{x+h} - \sqrt{x}}{h}$

5) If f is a differentiable function at a , then

☐ f is a continuous function at a

☐ f is not a continuous function at a

6) If f is a continuous function at a , then f a differentiable function at a

☐ True ☐ False

7) If $y = x^4 + 5x^2 + 3$, then $y' =$

☐ $4x^5 + 10x^2$

☐ $4x^3 - 10x$

☐ $4x^5 - 10x^2$

☐ $4x^3 + 10x$

8) If $y = x^4 - 5x^2 + 3$, then $y' =$

☐ $4x^3 + 10x$

☐ $4x^3 - 10x$

☐ $4x^5 - 10x^2$

☐ $4x^5 + 10x^2$

9) If $y = x^{-\frac{5}{2}}$, then $y' =$			
☐ a $-\frac{5}{2}x^{-\frac{7}{2}}$	☐ b $\frac{5}{2}x^{-\frac{7}{2}}$	☐ c $-\frac{5}{2}x^{\frac{7}{2}}$	☐ d $-\frac{5}{2}x^{-\frac{3}{2}}$
10) If $y = \frac{1}{3x^3} + 2\sqrt{x} = \frac{1}{3}x^{-3} + 2x^{\frac{1}{2}}$, then $y' =$			
☐ a $\frac{1}{x^4} + \frac{1}{\sqrt{x}}$	☐ b $-\frac{1}{x^4} + \frac{1}{\sqrt{x}}$	☐ c $-\frac{1}{x^2} + \frac{1}{\sqrt{x}}$	☐ d $-\frac{1}{x^4} + \frac{1}{2\sqrt{x}}$
11) If $y = (x-3)(x-2)$, then $y' =$			
☐ a $2x+1$	☐ b $2x-1$	☐ c $2x+5$	☐ d $2x-5$
12) If $y = (x^3+3)(x^2-1)$, then $y' =$			
☐ a $5x^4 - 3x^2 + 6x$	☐ b $5x^4 - x^2 + 6x$	☐ c $5x^4 - 3x^2$	☐ d $4x^3 - 3x^2 + 6x$
13) If $y = \sqrt{x}(2x+1)$, then $y' =$			
☐ a $2\sqrt{x} + \frac{2x+1}{\sqrt{x}}$	☐ b $2\sqrt{x} + \frac{2x+1}{2\sqrt{x}}$	☐ c $2\sqrt{x} + \frac{x+1}{\sqrt{x}}$	☐ d $\sqrt{x} + \frac{2x+1}{2\sqrt{x}}$
14) If $y = \frac{x+3}{x-2}$, then $y' =$			
☐ a $-\frac{1}{(x-2)^2}$	☐ b $-\frac{5}{(x-2)^2}$	☐ c $\frac{5}{(x-2)^2}$	☐ d $\frac{1}{(x-2)^2}$
15) If $y = \frac{x+3}{x-2}$, then $y' _{x=4} =$			
☐ a $-\frac{1}{4}$	☐ b $-\frac{5}{4}$	☐ c $\frac{5}{4}$	☐ d $\frac{1}{4}$
16) If $y = \frac{x-1}{x+2}$, then $y' =$			
☐ a $\frac{3}{(x+2)^2}$	☐ b $-\frac{1}{(x+2)^2}$	☐ c $-\frac{3}{(x+2)^2}$	☐ d $\frac{1}{(x+2)^2}$
17) If $y = \sqrt{3x^2+6x}$, then $y' =$			
☐ a $\frac{6(x+1)}{\sqrt{3x^2+6x}}$	☐ b $\frac{x+6}{\sqrt{3x^2+6x}}$	☐ c $\frac{3(x+1)}{\sqrt{3x^2+6x}}$	☐ d $\frac{x+1}{2\sqrt{3x^2+6x}}$
18) If $y = \sqrt{3x^2+6x}$, then $y' _{x=1} =$			
☐ a 4	☐ b $\frac{6}{3}$	☐ c 2	☐ d $\frac{1}{3}$
19) The tangent line equation to the curve $y = x^2 + 2$ at the point $(1,3)$ is			
☐ a $y = 2x - 5$	☐ b $y = -2x + 5$	☐ c $y = 2x + 1$	☐ d $y = 2x - 1$

20) The tangent line equation to the curve $y = \frac{2x}{x+1}$ at the point (0,0) is			
☐ a $y = -2x$	☐ b $y = -2x + 1$	☐ c $y = 2x$	☐ d $y = 2x - 1$
21) The tangent line equation to the curve $y = 3x^2 - 13$ at the point (2,-1) is			
☐ a $y = 6x - 7$	☐ b $y = 12x - 3$	☐ c $y = -12x + 23$	☐ d $y = 12x - 25$
22) The tangent line equation to the curve $f(x) = 3x^2 + 2x + 5$ at the point (0,5) is			
☐ a $y = -2x + 5$	☐ b $y = -2x + 5$	☐ c $y = 2x - 5$	☐ d $y = 2x + 5$
23) If $y = xe^x$, then $y' =$			
☐ a $x + e^x$	☐ b $1 + e^x$	☐ c $xe^x + 1$	☐ d $e^x(x + 1)$
24) If $y = x - e^x$, then $y'' =$			
☐ a e^x	☐ b $-e^x$	☐ c $1 - e^x$	☐ d $1 + e^x$
25) If $x^2 - y^2 = 4$, then $y' =$			
☐ a $-\frac{y}{x}$	☐ b $-\frac{x}{y}$	☐ c $\frac{x}{y}$	☐ d $\frac{y}{x}$
26) If $x^2 + y^2 = 4$, then $y' =$			
☐ a $-\frac{y}{x}$	☐ b $-\frac{x}{y}$	☐ c $\frac{x}{y}$	☐ d $\frac{y}{x}$
27) If $y = \frac{x+1}{x+2}$, then $y' =$			
☐ a $-\frac{1}{(x+2)^2}$	☐ b $\frac{3}{(x+2)^2}$	☐ c $-\frac{3}{(x+2)^2}$	☐ d $\frac{1}{(x+2)^2}$
28) If $y = \frac{1}{\sqrt[2]{x^5}} + \sec x$, then $y' =$			
☐ a $-\frac{5}{2}x^{-7/2} - \sec x \tan x$	☐ b $-\frac{5}{2}x^{7/2} + \sec x \tan x$		
☐ c $-\frac{5}{2}x^{-7/2} + \sec x \tan x$	☐ d $-\frac{5}{2}x^{-3/2} - \csc x \cot x$		
29) If $y = \tan^{-1}(x^3)$, then $y' =$			
☐ a $-\frac{3x^2}{1+x^6}$	☐ b $-\frac{3x^2}{1+x^5}$	☐ c $\frac{3x^2}{1+x^5}$	☐ d $\frac{3x^2}{1+x^6}$
30) If $y = \tan x - x$, then $y' =$			
☐ a $\sec^2 x$	☐ b $\sec^2 x - 1$	☐ c $-\sec^2 x - 1$	☐ d $\sec x^2 - 1$

31) If $y = \sec^2 x - 1$, then $y' =$			
☐ a	$2\sec^2 x \tan x$	☐ b	$\sec^2 x \tan x$
☐ c	$2\sec x \tan x$	☐ d	$-2\sec^2 x \tan x$
32) If $y = x^{\sin x}$, then $y' =$			
☐ a	$x^{\sin x} \left[\frac{\sin x}{x} + \cos x \ln x \right]$	☐ b	$\left[\frac{\sin x}{x} + \cos x \ln x \right]$
☐ c	$x^{\sin x} \left[\frac{\sin x}{x} - \cos x \ln x \right]$	☐ d	$x^{\sin x} \left[\frac{\cos x}{x} - \sin x \ln x \right]$
33) If $y = x^{\cos x}$, then $y' =$			
☐ a	$x^{\cos x} \left[\frac{\sin x}{x} + \cos x \ln x \right]$	☐ b	$\left[\frac{\cos x}{x} - \sin x \ln x \right]$
☐ c	$x^{\cos x} \left[\frac{\cos x}{x} + \sin x \ln x \right]$	☐ d	$x^{\cos x} \left[\frac{\cos x}{x} - \sin x \ln x \right]$
34) If $y = (2x^2 + \csc x)^9$, then $y' =$			
☐ a	$9(2x^2 + \csc x)^8 (4x - \csc x \cot x)$	☐ b	$9(2x^2 + \csc x)^8$
☐ c	$9(2x^2 + \csc x)^8 (4x + \csc x \cot x)$	☐ d	$36x (2x^2 + \csc x)^8$
35) If $y = \frac{5^x}{\cot x}$, then $y' =$			
☐ a	$\frac{5^x (\cot x + \csc^2 x)}{\cot^2 x}$	☐ b	$\frac{5^x (\ln 5 \cot x + \csc^2 x)}{\cot^2 x}$
☐ c	$\frac{5^x (\cot x - \csc^2 x)}{\cot^2 x}$	☐ d	$\frac{5^x (\ln 5 \cot x - \csc^2 x)}{\cot^2 x}$
36) If $y = e^{2x}$, then $y^{(6)} =$			
☐ a	$128e^{2x}$	☐ b	$16e^{2x}$
☐ c	$64e^{2x}$	☐ d	$32e^{2x}$
37) If $y = x^{-2}e^{\sin x}$, then $y' =$			
☐ a	$x^{-3}e^{\sin x} (x \cos x - 2)$	☐ b	$x^{-3}e^{\sin x} (\cos x - 2)$
☐ c	$x^{-3}e^{\sin x} (x \cos x - 1)$	☐ d	$x^{-2}e^{\sin x} (x \cos x - 2)$
38) If $y = 5^{\tan x}$, then $y' =$			
☐ a	$5^{\tan x} \sec^2 x \ln 5$	☐ b	$5^{\tan x} \sec^2 x$
☐ c	$-5^{\tan x} \sec^2 x \ln 5$	☐ d	$5^{\tan x} \ln 5$

39) If $x^2 + y^2 = 3xy + 7$, then $y' =$			
☐ $\frac{2x + y}{3x - 2y}$	☐ $\frac{3y - 2x}{2y - 3x}$	☐ $\frac{2x}{3 - 2y}$	☐ $\frac{2x}{y}$
40) If $y = \sin^3(4x)$, then $y' =$			
☐ $4\cos^3(4x)$	☐ $3\sin^2(4x)\cos(4x)$		
☐ $12\sin^2(4x)\cos(4x)$	☐ $12\sin^2 x \cos x$		
41) If $y = 3^x \cot x$, then $y' =$			
☐ $3^x \ln 3 \cot x + 3^x \sec^2 x$	☐ $3^x \cot x + 3^x \sec^2 x$		
☐ $3^x \cot x - 3^x \csc^2 x$	☐ $3^x \ln 3 \cot x - 3^x \csc^2 x$		
42) If $y = (2x^2 + \sec x)^7$, then $y' =$			
☐ $7(2x^2 + \sec x)^6$	☐ $7(2x^2 + \sec x)^6(4x - \sec x \tan x)$		
☐ $7(2x^2 + \sec x)^6(4x + \sec x \tan x)$	☐ $28x(2x^2 + \sec x)^6$		
43) If $f(x) = \cos x$, then $f^{(45)}(x) =$			
☐ $\sin x$	☐ $-\sin x$	☐ $\cos x$	☐ $-\cos x$
44) $D^{47}(\sin x) =$			
☐ $\sin x$	☐ $-\sin x$	☐ $\cos x$	☐ $-\cos x$
45) If $y = x^x$, then $y' =$			
☐ $1 + \ln x$	☐ $x^x(1 + \ln x)$	☐ x^x	☐ $x^x \ln x$
46) If $f(x) = \frac{\ln x}{x^2}$, then $f'(1) =$			
☐ 1	☐ 4	☐ 0	☐ 2
47) If $y = \cot^{-1}(e^x)$, then $y' =$			
☐ $-\frac{e^x}{1 + e^{2x}}$	☐ $\frac{1}{1 + e^{2x}}$	☐ $-\frac{1}{1 + e^{2x}}$	☐ $\frac{e^x}{1 + e^{2x}}$
48) If $y = \tan^{-1}(e^x)$, then $y' =$			
☐ $-\frac{e^x}{1 + e^{2x}}$	☐ $\frac{1}{1 + e^{2x}}$	☐ $-\frac{1}{1 + e^{2x}}$	☐ $\frac{e^x}{1 + e^{2x}}$
49) If $y = \sin^{-1}(e^x)$, then $y' =$			
☐ $-\frac{1}{\sqrt{1 - e^{2x}}}$	☐ $\frac{e^x}{\sqrt{1 - e^{2x}}}$	☐ $-\frac{e^x}{\sqrt{1 - e^{2x}}}$	☐ $\frac{1}{\sqrt{1 - e^{2x}}}$

50) If $y = \cos^{-1}(e^x)$, then $y' =$	
☐ $-\frac{1}{\sqrt{1-e^{2x}}}$	☐ $\frac{e^x}{\sqrt{1-e^{2x}}}$
☐ $-\frac{e^x}{\sqrt{1-e^{2x}}}$	☐ $\frac{1}{\sqrt{1-e^{2x}}}$
51) If $y = \cos(2x^3)$, then $y' =$	
☐ $6x^2 \sin(2x^3)$	☐ $-6x^2 \sin(2x^3)$
☐ $-6\sin(2x^3)$	☐ $-6x \sin(2x^3)$
52) If $y = \csc x \cot x$, then $y' =$	
☐ $\csc^3 x - \csc x \cot^2 x$	☐ $\csc x^3 + \csc x \cot^2 x$
☐ $-\csc^3 x - \csc x \cot^2 x$	☐ $-\csc^3 x - \csc x \cot x^2$
53) If $y = \sqrt{x^2 - 2\sec x}$, then $y' =$	
☐ $\frac{x - \sec x \tan x}{2\sqrt{x^2 - 2\sec x}}$	☐ $\frac{x + \sec x \tan x}{2\sqrt{x^2 - 2\sec x}}$
☐ $\frac{x - \sec x \tan x}{\sqrt{x^2 - 2\sec x}}$	☐ $\frac{x + \sec x \tan x}{\sqrt{x^2 - 2\sec x}}$
54) If $y = (3x^2 + 1)^6$, then $y' =$	
☐ $6(3x^2 + 1)^6$	☐ $36x(3x^2 + 1)^5$
☐ $36(3x^2 + 1)^5$	☐ $6x(3x^2 + 1)^5$
55) If $xy + \tan x = 2x^3 + \sin y$, then $y' =$	
☐ $\frac{6x^2 - y - \sec^2 x}{x - \cos y}$	☐ $\frac{6x^2 + y - \sec^2 x}{x - \cos y}$
☐ $\frac{6x^2 - y + \sec^2 x}{x - \cos y}$	☐ $\frac{x - \cos y}{6x^2 - y - \sec^2 x}$
56) If $y = x^{-1} \sec x$, then $y' =$	
☐ $-x^{-2} \sec x + x^{-1} \sec x \tan x$	☐ $x^{-2} \sec x - x^{-1} \sec x \tan x$
☐ $-x^{-2} \sec x - x^{-1} \sec x \tan x$	☐ $x^{-2} \sec x + x^{-1} \sec x \tan x$

57) If $y = \sin^{-1}(x^3)$, then $y' =$	
☐ $\frac{3x^2}{\sqrt{1-x^6}}$	☐ $-\frac{3x^2}{\sqrt{1-x^6}}$
☐ $-\frac{3x^2}{\sqrt{1-x^5}}$	☐ $\frac{3x^2}{\sqrt{1-x^5}}$
58) If $y = \cos^{-1}(x^3)$, then $y' =$	
☐ $\frac{3x^2}{\sqrt{1-x^6}}$	☐ $-\frac{3x^2}{\sqrt{1-x^6}}$
☐ $-\frac{3x^2}{\sqrt{1-x^5}}$	☐ $\frac{3x^2}{\sqrt{1-x^5}}$
59) If $y = \sec^{-1}(x^3)$, then $y' =$	
☐ $\frac{3}{x\sqrt{x^5-1}}$	☐ $-\frac{3}{x\sqrt{x^5-1}}$
☐ $-\frac{3}{x\sqrt{x^6-1}}$	☐ $\frac{3}{x\sqrt{x^6-1}}$
60) If $y = \csc^{-1}(x^3)$, then $y' =$	
☐ $\frac{3}{x\sqrt{x^5-1}}$	☐ $-\frac{3}{x\sqrt{x^5-1}}$
☐ $-\frac{3}{x\sqrt{x^6-1}}$	☐ $\frac{3}{x\sqrt{x^6-1}}$
61) If $y = \ln(x^3 - 2\sec x)$, then $y' =$	
☐ $\frac{x^2 - 2\sec x \tan x}{x^3 - 2\sec x}$	☐ $\frac{3x^2 - 2\sec x \tan x}{x^3 - 2\sec x}$
☐ $\frac{3x^2 - 2\sec x}{x^3 - 2\sec x}$	☐ $\frac{3x^2 + 2\sec x \tan x}{x^3 - 2\sec x}$
62) If $y = \ln(\cos x)$, then $y' =$	
☐ $\tan x$	☐ $-\tan x$
☐ $\cot x$	☐ $-\cot x$
63) If $y = \ln(\sin x)$, then $y' =$	
☐ $\tan x$	☐ $-\tan x$
☐ $\cot x$	☐ $-\cot x$
64) If $y = \ln\sqrt{3x^2 + 5x}$, then $y' =$	
☐ $\frac{6x + 5}{3x^2 + 5x}$	☐ $\frac{6x + 5}{2(3x^2 + 5x)}$
☐ $\frac{6x + 5}{(3x^2 + 5x)\ln 5}$	☐ $\frac{6x}{2(3x^2 + 5x)}$

65) If $y = \log_5(x^3 - 2\csc x)$, then $y' =$			
☐ a	$\frac{3x^2 + 2\csc x \cot x}{x^3 - 2\csc x \ln 5}$	☐ b	$\frac{3x^2 - 2\csc x \cot x}{(x^3 - 2\csc x) \ln 5}$
☐ c	$\frac{3x^2 + 2\csc x \cot x}{x^3 - 2\csc x}$	☐ d	$\frac{3x^2 + 2\csc x \cot x}{(x^3 - 2\csc x) \ln 5}$
66) If $y = \ln \frac{x-1}{\sqrt{x+2}}$, then $y' =$			
☐ a	$\frac{x+5}{2(x-1)(x-2)}$	☐ b	$\frac{x+5}{(x-1)(x-2)}$
☐ c	$\frac{x-5}{2(x-1)(x-2)}$	☐ d	$\frac{x}{2(x-1)(x-2)}$
67) If $y = 2x^3 - \sin x$, then $y' =$			
☐ a	$6x^2 + \cos x$	☐ b	$6x^2 - \cos x$
☐ c	$3x^2 - \cos x$	☐ d	$6x^2 - \sin x$
68) If $y = x^3 \cos x$, then $y' =$			
☐ a	$3x^2 \cos x - x^3 \sin x$	☐ b	$3x^2 \cos x + x^3 \sin x$
☐ c	$3x^4 \cos x - x^3 \sin x$	☐ d	$3x^2 \sin x$
69) If $y = x^{\sqrt{x}}$, then $y' =$			
☐ a	$x^{\sqrt{x}} \left(\frac{1+\ln x}{\sqrt{x}} \right)$	☐ b	$x^{\sqrt{x}} \left(\frac{2+\ln x}{2\sqrt{x}} \right)$
☐ c	$\left(\frac{2+\ln x}{2\sqrt{x}} \right)$	☐ d	$x \left(\frac{2+\ln x}{2\sqrt{x}} \right)$
70) If $y = (\sin x)^x$, then $y' =$			
☐ a	$(\sin x)^x (\ln(\sin x) - x \tan x)$	☐ b	$(\sin x)^x (\ln(\sin x) + x \tan x)$
☐ c	$(\sin x)^x (\ln(\sin x) + x \cot x)$	☐ d	$\ln(\sin x) - x \tan x$
71) If $y = \log_7(x^3 - 2)$, then $y' =$			
☐ a	$\frac{x^2}{(x^3 - 2) \ln 7}$	☐ b	$\frac{3x^2}{x^3 - 2}$
☐ c	$\frac{1}{(x^3 - 2) \ln 7}$	☐ d	$\frac{3x^2}{(x^3 - 2) \ln 7}$
72) If $y = \cos(x^5)$, then $y' =$			
☐ a	$5x^4 \sin(x^5)$	☐ b	$5\sin^4(x)$
☐ c	$-5x^4 \sin(x^5)$	☐ d	$x^5 \sin x + 5x^4 \sin x$

73) If $y = \sec x \tan x$, then $y' =$			
☐ a $\sec^3 x + \sec x \tan^2 x$	☐ b $\sec^3 x + \sec x \tan^2 x$		
☐ c $\sec^3 x + \sec x \tan x^2$	☐ d $\sec^3 x - \sec x \tan^2 x$		
74) $D^{99}(\cos x) =$			
☐ a $\sin x$	☐ b $\cos x$	☐ c $-\sin x$	☐ d $-\cos x$
75) If $y = (x + \sec x)^3$, then $y' =$			
☐ a $3(x + \sec x)^2(1 + \tan x)$	☐ b $3(x + \sec x)^2(1 + \sec x \tan x)$		
☐ c $(x + \sec x)^2(1 + \sec x \tan x)$	☐ d $\frac{1}{4}(x + \sec x)^4(1 + \sec x \tan x)$		
76) If $x^2 = 5y^2 + \sin y$, then $y' =$			
☐ a $\frac{2}{10y + \cos y}$	☐ b $\frac{2x}{10y - \cos y}$	☐ c $\frac{2x}{10y + \cos y}$	☐ d $\frac{x}{5y + \cos y}$
77) If $x^2 - 5y^2 + \sin y = 0$, then $y' =$			
☐ a $\frac{2}{10y + \cos y}$	☐ b $\frac{2x}{10y - \cos y}$	☐ c $\frac{2x}{10y + \cos y}$	☐ d $\frac{x}{5y + \cos y}$
78) If $y = \sin x \sec x$, then $y' =$			
☐ a $\sin x \tan x + 1$	☐ b $\sec^2 x$	☐ c $\sin x \tan x - 1$	☐ d $\sin x \sec x \tan x - 1$
79) If $f(x) = \sin^2(x^3 + 1)$, then $f'(x) =$			
☐ a $6x^2 \sin(x^3 + 1) \cos(x^3 + 1)$	☐ b $3x^2 \sin(x^3 + 1) \cos(x^3 + 1)$		
☐ c $-6x^2 \sin(x^3 + 1) \cos(x^3 + 1)$	☐ d $2x^2 \sin(x^3 + 1) \cos(x^3 + 1)$		
80) If $y = (x + \cot x)^3$, then $y' =$			
☐ a $3(x + \cot x)^2(1 + \csc^2 x)$	☐ b $3(x + \cot x)^2(1 - \csc^2 x)$		
☐ c $-3(x + \cot x)^2(1 - \csc^2 x)$	☐ d $(x + \cot x)^2(1 - \csc^2 x)$		
81) If $y = \tan^{-1}\left(\frac{x}{2}\right)$, then $y' =$			
☐ a $\frac{4}{4 + x^2}$	☐ b $\frac{2}{4 + x^2}$	☐ c $-\frac{2}{4 + x^2}$	☐ d $\frac{1}{\sqrt{4 - x^2}}$

82) If $y = \cot^{-1}\left(\frac{x}{2}\right)$, then $y' =$			
☐ a $\frac{4}{4+x^2}$	☐ b $\frac{2}{4+x^2}$	☐ c $-\frac{2}{4+x^2}$	☐ d $\frac{1}{\sqrt{4-x^2}}$
83) If $y = \sin^{-1}\left(\frac{x}{3}\right)$, then $y' =$			
☐ a $\frac{3}{\sqrt{9+x^2}}$	☐ b $\frac{x}{\sqrt{9-x^2}}$	☐ c $-\frac{1}{\sqrt{9-x^2}}$	☐ d $\frac{1}{\sqrt{9-x^2}}$
84) If $y = \cos^{-1}\left(\frac{x}{3}\right)$, then $y' =$			
☐ a $\frac{3}{\sqrt{9+x^2}}$	☐ b $\frac{x}{\sqrt{9-x^2}}$	☐ c $-\frac{1}{\sqrt{9-x^2}}$	☐ d $\frac{1}{\sqrt{9-x^2}}$
85) $D^{99}(\sin x) =$			
☐ a $\sin x$	☐ b $\cos x$	☐ c $-\sin x$	☐ d $-\cos x$

$\frac{d}{dx}(k) = 0; \quad k \in \mathbb{R}$	$\frac{d}{dx}(u^n) = nu^{n-1} \cdot \frac{d}{dx}(u)$
$[kf(x)]' = k[f(x)]'; \quad (k \in \mathbb{R})$	$[f(x) \pm g(x)]' = f'(x) \pm g'(x)$
$[f(x)g(x)]' = f(x)g'(x) + f'(x)g(x)$	$\left[\frac{f(x)}{g(x)}\right]' = \frac{g(x)f'(x) - f(x)g'(x)}{[g(x)]^2}; \quad g(x) \neq 0$
$\frac{d}{dx}(\sin u) = \cos u \frac{du}{dx}$	$\frac{d}{dx}(\cos u) = -\sin u \frac{du}{dx}$
$\frac{d}{dx}(\tan u) = \sec^2 u \frac{du}{dx}$	$\frac{d}{dx}(\csc u) = -\csc u \cot u \frac{du}{dx}$
$\frac{d}{dx}(\sec u) = \sec u \tan u \frac{du}{dx}$	$\frac{d}{dx}(\cot u) = -\csc^2 u \frac{du}{dx}$
$\frac{d}{dx}(e^u) = e^u \frac{du}{dx}$	$\frac{d}{dx}(\ln u) = \left(\frac{1}{u}\right) \frac{du}{dx}$
$\frac{d}{dx}(a^u) = (a^u \ln a) \frac{du}{dx}$	$\frac{d}{dx}(\log_a u) = \left(\frac{1}{u \ln a}\right) \frac{du}{dx}$
$\frac{d}{dx}(\sin^{-1} u) = \frac{1}{\sqrt{1-u^2}} \left(\frac{du}{dx}\right); \quad -1 < u < 1$	$\frac{d}{dx}(\cos^{-1} u) = -\frac{1}{\sqrt{1-u^2}} \left(\frac{du}{dx}\right); \quad -1 < u < 1$
$\frac{d}{dx}(\tan^{-1} u) = \frac{1}{1+u^2} \left(\frac{du}{dx}\right); \quad -\infty < u < \infty$	$\frac{d}{dx}(\cot^{-1} u) = -\frac{1}{1+u^2} \left(\frac{du}{dx}\right); \quad -\infty < u < \infty$
$\frac{d}{dx}(\sec^{-1} u) = \frac{1}{ u \sqrt{u^2-1}} \left(\frac{du}{dx}\right); \quad u > 1$	$\frac{d}{dx}(\csc^{-1} u) = -\frac{1}{ u \sqrt{u^2-1}} \left(\frac{du}{dx}\right); \quad u > 1$