King Abdul Aziz University — Faculty of Sciences
Mathematics Department — Math 110
Workshop 10 — Chapter 4
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1) If $f(x)$ is a differentiable function, then $f'(x) =$

a $\lim\limits_{h\to 0}\dfrac{f(x+h)-f(x)}{h}$ Θ

b $\lim\limits_{x\to 0}\dfrac{f(x+h)+f(x)}{h}$

c $\lim\limits_{h\to 0}\dfrac{f(x+h)+f(x)}{h}$

d $\lim\limits_{x\to 0}\dfrac{f(x+h)-f(x)}{h}$

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

a $\lim\limits_{x\to 0}\dfrac{4(x+h)^2-(4x^2)}{h}$

b $\lim\limits_{x\to 0}\dfrac{4(x+h)^2+(4x^2)}{h}$

c $\lim\limits_{h\to 0}\dfrac{4(x+h)^2+(4x^2)}{h}$

d $\lim\limits_{h\to 0}\dfrac{4(x+h)^2-(4x^2)}{h}$ Θ

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

a $\lim\limits_{x\to 0}\dfrac{\left[(x+h)^2-3\right]-\left[x^2-3\right]}{h}$

b $\lim\limits_{x\to 0}\dfrac{\left[(x+h)^2-3\right]+\left[x^2-3\right]}{h}$

c $\lim\limits_{h\to 0}\dfrac{\left[(x+h)^2-3\right]-\left[x^2-3\right]}{h}$ Θ

d $\lim\limits_{h\to 0}\dfrac{\left[(x+h)^2-3\right]+\left[x^2-3\right]}{h}$

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

a $\lim\limits_{x\to 0}\dfrac{\sqrt{x+h}-\sqrt{x}}{h}$

b $\lim\limits_{h\to 0}\dfrac{\sqrt{x+h}-\sqrt{x}}{h}$ Θ

c $\lim\limits_{h\to 0}\dfrac{\sqrt{x+h}+\sqrt{x}}{h}$

d $\lim\limits_{x\to 0}\dfrac{\sqrt{x+h}+\sqrt{x}}{h}$

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

a f is a continuous function at a Θ

b f is not a continuous function at a

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

a True b False Θ

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

a $4x^5+10x^2$ b $4x^3-10x$ c $4x^5-10x^2$ d $4x^3+10x$ Θ

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

a $4x^3+10x$ b $4x^3-10x$ Θ c $4x^5-10x^2$ d $4x^5+10x^2$

9) If $y = x^{-5/2}$, then $y' =$

$\boxed{a}$ $-\dfrac{5}{2}x^{-7/2}$ Θ $\boxed{b}$ $\dfrac{5}{2}x^{-7/2}$ $\boxed{c}$ $-\dfrac{5}{2}x^{7/2}$ $\boxed{d}$ $-\dfrac{5}{2}x^{-3/2}$

10) If $y = \dfrac{1}{3x^3} + 2\sqrt{x} = \dfrac{1}{3}x^{-3} + 2x^{1/2} =$, then $y' =$

$\boxed{a}$ $\dfrac{1}{x^4} + \dfrac{1}{\sqrt{x}}$ $\boxed{b}$ $-\dfrac{1}{x^4} + \dfrac{1}{\sqrt{x}}$ Θ $\boxed{c}$ $-\dfrac{1}{x^2} + \dfrac{1}{\sqrt{x}}$ $\boxed{d}$ $-\dfrac{1}{x^4} + \dfrac{1}{2\sqrt{x}}$

11) If $y = (x-3)(x-2)$, then $y' =$

$\boxed{a}$ $2x+1$ $\boxed{b}$ $2x-1$ $\boxed{c}$ $2x+5$ $\boxed{d}$ $2x-5$ Θ

12) If $y = (x^3+3)(x^2-1)$, then $y' =$

$\boxed{a}$ $5x^4 - 3x^2 + 6x$ Θ $\boxed{b}$ $5x^4 - x^2 + 6x$ $\boxed{c}$ $5x^4 - 3x^2$ $\boxed{d}$ $4x^3 - 3x^2 + 6x$

13) If $y = \sqrt{x}(2x+1)$, then $y' =$

$\boxed{a}$ $2\sqrt{x} + \dfrac{2x+1}{\sqrt{x}}$ $\boxed{b}$ $2\sqrt{x} + \dfrac{2x+1}{2\sqrt{x}}$ Θ $\boxed{c}$ $2\sqrt{x} + \dfrac{x+1}{\sqrt{x}}$ $\boxed{d}$ $\sqrt{x} + \dfrac{2x+1}{2\sqrt{x}}$

14) If $y = \dfrac{x+3}{x-2}$, then $y' =$

$\boxed{a}$ $-\dfrac{1}{(x-2)^2}$ $\boxed{b}$ $-\dfrac{5}{(x-2)^2}$ Θ $\boxed{c}$ $\dfrac{5}{(x-2)^2}$ $\boxed{d}$ $\dfrac{1}{(x-2)^2}$

15) If $y = \dfrac{x+3}{x-2}$, then $y'\big|_{x=4} =$

$\boxed{a}$ $-\dfrac{1}{4}$ $\boxed{b}$ $-\dfrac{5}{4}$ Θ $\boxed{c}$ $\dfrac{5}{4}$ $\boxed{d}$ $\dfrac{1}{4}$

16) If $y = \dfrac{x-1}{x+2}$, then $y' =$

$\boxed{a}$ $\dfrac{3}{(x+2)^2}$ Θ $\boxed{b}$ $-\dfrac{1}{(x+2)^2}$ $\boxed{c}$ $-\dfrac{3}{(x+2)^2}$ $\boxed{d}$ $\dfrac{1}{(x+2)^2}$

17) If $y = \sqrt{3x^2+6x}$, then $y' =$

$\boxed{a}$ $\dfrac{6(x+1)}{\sqrt{3x^2+6x}}$ $\boxed{b}$ $\dfrac{x+6}{\sqrt{3x^2+6x}}$ $\boxed{c}$ $\dfrac{3(x+1)}{\sqrt{3x^2+6x}}$ Θ $\boxed{d}$ $\dfrac{x+1}{2\sqrt{3x^2+6x}}$

18) If $y = \sqrt{3x^2+6x}$, then $y'\big|_{x=1} =$

$\boxed{a}$ 4 $\boxed{b}$ $\dfrac{6}{3}$ $\boxed{c}$ 2 Θ $\boxed{d}$ $\dfrac{1}{3}$

19) The tangent line equation to the curve $y = x^2 + 2$ at the point $(1,3)$ is

$\boxed{a}$ $y = 2x - 5$ $\boxed{b}$ $y = -2x + 5$ $\boxed{c}$ $y = 2x + 1$ Θ $\boxed{d}$ $y = 2x - 1$

20) The tangent line equation to the curve $y=\dfrac{2x}{x+1}$ at the point $(0,0)$ is

$\boxed{a}$ $y=-2x$ $\boxed{b}$ $y=-2x+1$ $\boxed{c}$ $y=2x$ Θ $\boxed{d}$ $y=2x-1$

21) The tangent line equation to the curve $y=3x^2-13$ at the point $(2,-1)$ is

$\boxed{a}$ $y=6x-7$ $\boxed{b}$ $y=12x-3$ $\boxed{c}$ $y=-12x+23$ $\boxed{d}$ $y=12x-25$ Θ

22) The tangent line equation to the curve $f(x)=3x^2+2x+5$ at the point $(0,5)$ is

$\boxed{a}$ $y=-2x+5$ $\boxed{b}$ $y=-2x+5$ $\boxed{c}$ $y=2x-5$ $\boxed{d}$ $y=2x+5$ Θ

23) If $y=xe^x$, then $y'=$

$\boxed{a}$ $x+e^x$ $\boxed{b}$ $1+e^x$ $\boxed{c}$ xe^x+1 $\boxed{d}$ $e^x(x+1)$ Θ

24) If $y=x-e^x$, then $y''=$

$\boxed{a}$ e^x $\boxed{b}$ $-e^x$ Θ $\boxed{c}$ $1-e^x$ $\boxed{d}$ $1+e^x$

25) If $x^2-y^2=4$, then $y'=$

$\boxed{a}$ $-\dfrac{y}{x}$ $\boxed{b}$ $-\dfrac{x}{y}$ $\boxed{c}$ $\dfrac{x}{y}$ Θ $\boxed{d}$ $\dfrac{y}{x}$

26) If $x^2+y^2=4$, then $y'=$

$\boxed{a}$ $-\dfrac{y}{x}$ $\boxed{b}$ $-\dfrac{x}{y}$ Θ $\boxed{c}$ $\dfrac{x}{y}$ $\boxed{d}$ $\dfrac{y}{x}$

27) If $y=\dfrac{x+1}{x+2}$, then $y'=$

$\boxed{a}$ $-\dfrac{1}{(x+2)^2}$ $\boxed{b}$ $\dfrac{3}{(x+2)^2}$ $\boxed{c}$ $-\dfrac{3}{(x+2)^2}$ $\boxed{d}$ $\dfrac{1}{(x+2)^2}$ Θ

28) If $y=\dfrac{1}{\sqrt[2]{x^5}}+\sec x$, then $y'=$

$\boxed{a}$ $-\dfrac{5}{2}x^{-7/2}-\sec x\tan x$ $\boxed{b}$ $-\dfrac{5}{2}x^{7/2}+\sec x\tan x$ Θ

$\boxed{c}$ $-\dfrac{5}{2}x^{-7/2}+\sec x\tan x$ $\boxed{d}$ $-\dfrac{5}{2}x^{-3/2}-\csc x\cot x$

29) If $y=\tan^{-1}\left(x^3\right)$, then $y'=$

$\boxed{a}$ $-\dfrac{3x^2}{1+x^6}$ $\boxed{b}$ $-\dfrac{3x^2}{1+x^5}$ $\boxed{c}$ $\dfrac{3x^2}{1+x^5}$ $\boxed{d}$ $\dfrac{3x^2}{1+x^6}$ Θ

30) If $y=\tan x-x$, then $y'=$

$\boxed{a}$ $\sec^2 x$ $\boxed{b}$ $\sec^2 x-1$ Θ $\boxed{c}$ $-\sec^2 x-1$ $\boxed{d}$ $\sec x^2-1$

31) If $y = \sec^2 x - 1$, then $y' =$

$\boxed{a}$ $2\sec^2 x \tan x$ Θ $\boxed{b}$ $\sec^2 x \tan x$ $\boxed{c}$ $2\sec x \tan x$ $\boxed{d}$ $-2\sec^2 x \tan x$

32) If $y = x^{\sin x}$, then $y' =$

$\boxed{a}$ $x^{\sin x}\left[\frac{\sin x}{x} + \cos x \ln x\right]$ Θ $\boxed{b}$ $\left[\frac{\sin x}{x} + \cos x \ln x\right]$

$\boxed{c}$ $x^{\sin x}\left[\frac{\sin x}{x} - \cos x \ln x\right]$ $\boxed{d}$ $x^{\sin x}\left[\frac{\cos x}{x} - \sin x \ln x\right]$

1) If $y = x^{\cos x}$, then $y' =$

$\boxed{a}$ $x^{\cos x}\left[\frac{\sin x}{x} + \cos x \ln x\right]$ $\boxed{b}$ $\left[\frac{\cos x}{x} - \sin x \ln x\right]$

$\boxed{c}$ $x^{\cos x}\left[\frac{\cos x}{x} + \sin x \ln x\right]$ $\boxed{d}$ $x^{\cos x}\left[\frac{\cos x}{x} - \sin x \ln x\right]$ Θ

33) If $y = \left(2x^2 + \csc x\right)^9$, then $y' =$

$\boxed{a}$ $9\left(2x^2 + \csc x\right)^8 \left(4x - \csc x \cot x\right)$ Θ $\boxed{b}$ $9\left(2x^2 + \csc x\right)^8$

$\boxed{c}$ $9\left(2x^2 + \csc x\right)^8 \left(4x + \csc x \cot x\right)$ $\boxed{d}$ $36x\left(2x^2 + \csc x\right)^8$

34) If $y = \frac{5^x}{\cot x}$, then $y' =$

$\boxed{a}$ $\frac{5^x\left(\cot x + \csc^2 x\right)}{\cot^2 x}$ $\boxed{b}$ $\frac{5^x\left(\ln 5 \cot x + \csc^2 x\right)}{\cot^2 x}$ Θ

$\boxed{c}$ $\frac{5^x\left(\cot x - \csc^2 x\right)}{\cot^2 x}$ $\boxed{d}$ $\frac{5^x\left(\ln 5 \cot x - \csc^2 x\right)}{\cot^2 x}$

35) If $y = e^{2x}$, then $y^{(6)} =$

$\boxed{a}$ $128e^{2x}$ $\boxed{b}$ $16e^{2x}$ $\boxed{c}$ $64e^{2x}$ Θ $\boxed{d}$ $32e^{2x}$

36) If $y = x^{-2}e^{\sin x}$, then $y' =$

$\boxed{a}$ $x^{-3}e^{\sin x}\left(x\cos x - 2\right)$ Θ $\boxed{b}$ $x^{-3}e^{\sin x}\left(\cos x - 2\right)$

$\boxed{c}$ $x^{-3}e^{\sin x}\left(x\cos x - 1\right)$ $\boxed{d}$ $x^{-2}e^{\sin x}\left(x\cos x - 2\right)$

37) If $y = 5^{\tan x}$, then $y' =$

$\boxed{a}$ $5^{\tan x}\sec^2 x \ln 5$ Θ $\boxed{b}$ $5^{\tan x}\sec^2 x$ $\boxed{c}$ $-5^{\tan x}\sec^2 x \ln 5$ $\boxed{d}$ $5^{\tan x}\ln 5$

38) If $x^2+y^2=3xy+7$, then $y'=$ $\boxed{a}$ $\dfrac{2x+y}{3x-2y}$ $\boxed{b}$ $\dfrac{3y-2x}{2y-3x}$ Θ $\boxed{c}$ $\dfrac{2x}{3-2y}$ $\boxed{d}$ $\dfrac{2x}{y}$
39) If $x^2+y^2=3xy+7$, then $y'=$ $\boxed{a}$ $\dfrac{2x+y}{3x-2y}$ $\boxed{b}$ $\dfrac{3y-2x}{2y-3x}$ Θ $\boxed{c}$ $\dfrac{2x}{3-2y}$ $\boxed{d}$ $\dfrac{2x}{y}$
40) If $y=\sin^3(4x)$, then $y'=$ $\boxed{a}$ $4\cos^3(4x)$ $\boxed{b}$ $3\sin^2(4x)\cos(4x)$ $\boxed{c}$ $12\sin^2(4x)\cos(4x)$ Θ $\boxed{d}$ $12\sin^2 x\cos x$
41) If $y=3^x\cot x$, then $y'=$ $\boxed{a}$ $3^x\ln 3\cot x+3^x\sec^2 x$ $\boxed{b}$ $3^x\cot x+3^x\sec^2 x$ $\boxed{c}$ $3^x\cot x-3^x\csc^2 x$ $\boxed{d}$ $3^x\ln 3\cot x-3^x\csc^2 x$ Θ
42) If $y=\left(2x^2+\sec x\right)^7$, then $y'=$ $\boxed{a}$ $7\left(2x^2+\sec x\right)^6$ $\boxed{b}$ $7\left(2x^2+\sec x\right)^6(4x-\sec x\tan x)$ $\boxed{c}$ $7\left(2x^2+\sec x\right)^6(4x+\sec x\tan x)$ Θ $\boxed{d}$ $28x\left(2x^2+\sec x\right)^6$
43) If $f(x)=\cos x$, then $f^{(45)}(x)=$ $\boxed{a}$ $\sin x$ $\boxed{b}$ $-\sin x$ Θ $\boxed{c}$ $\cos x$ $\boxed{d}$ $-\cos x$
44) $D^{47}(\sin x)=$ $\boxed{a}$ $\sin x$ $\boxed{b}$ $-\sin x$ $\boxed{c}$ $\cos x$ $\boxed{d}$ $-\cos x$ Θ
45) If $y=x^x$, then $y'=$ $\boxed{a}$ $1+\ln x$ $\boxed{b}$ $x^x(1+\ln x)$ Θ $\boxed{c}$ x^x $\boxed{d}$ $x^x\ln x$
46) If $f(x)=\dfrac{\ln x}{x^2}$, then $f'(1)=$ $\boxed{a}$ 1 Θ $\boxed{b}$ 4 $\boxed{c}$ 0 $\boxed{d}$ 2
47) If $y=\cot^{-1}\left(e^x\right)$, then $y'=$ $\boxed{a}$ $-\dfrac{e^x}{1+e^{2x}}$ Θ $\boxed{b}$ $\dfrac{1}{1+e^{2x}}$ $\boxed{c}$ $-\dfrac{1}{1+e^{2x}}$ $\boxed{d}$ $\dfrac{e^x}{1+e^{2x}}$
48) If $y=\tan^{-1}\left(e^x\right)$, then $y'=$ $\boxed{a}$ $-\dfrac{e^x}{1+e^{2x}}$ $\boxed{b}$ $\dfrac{1}{1+e^{2x}}$ $\boxed{c}$ $-\dfrac{1}{1+e^{2x}}$ $\boxed{d}$ $\dfrac{e^x}{1+e^{2x}}$ Θ

49) If $y=\sin^{-1}\left(e^{x}\right)$, then $y'=$

$\boxed{a}$ $-\dfrac{1}{\sqrt{1-e^{2x}}}$ $\boxed{b}$ $\dfrac{e^{x}}{\sqrt{1-e^{2x}}}$ Θ $\boxed{c}$ $-\dfrac{e^{x}}{\sqrt{1-e^{2x}}}$ $\boxed{d}$ $\dfrac{1}{\sqrt{1-e^{2x}}}$

50) If $y=\cos^{-1}\left(e^{x}\right)$, then $y'=$

$\boxed{a}$ $-\dfrac{1}{\sqrt{1-e^{2x}}}$ $\boxed{b}$ $\dfrac{e^{x}}{\sqrt{1-e^{2x}}}$ Θ $\boxed{c}$ $-\dfrac{e^{x}}{\sqrt{1-e^{2x}}}$ Θ $\boxed{d}$ $\dfrac{1}{\sqrt{1-e^{2x}}}$

51) If $y=\cos(2x^{3})$, then $y'=$

$\boxed{a}$ $6x^{2}\sin(2x^{3})$ $\boxed{b}$ $-6x^{2}\sin(2x^{3})$ Θ

$\boxed{c}$ $-6\sin(2x^{3})$ $\boxed{d}$ $-6x\sin(2x^{3})$

52) If $y=\csc x\cot x$, then $y'=$

$\boxed{a}$ $\csc^{3}x-\csc x\cot^{2}x$ $\boxed{b}$ $\csc x^{3}+\csc x\cot^{2}x$

$\boxed{c}$ $-\csc^{3}x-\csc x\cot^{2}x$ Θ $\boxed{d}$ $-\csc^{3}x-\csc x\cot x^{2}$

53) If $y=\sqrt{x^{2}-2\sec x}$, then $y'=$

$\boxed{a}$ $\dfrac{x-\sec x\tan x}{2\sqrt{x^{2}-2\sec x}}$ $\boxed{b}$ $\dfrac{x+\sec x\tan x}{2\sqrt{x^{2}-2\sec x}}$

$\boxed{c}$ $\dfrac{x-\sec x\tan x}{\sqrt{x^{2}-2\sec x}}$ Θ $\boxed{d}$ $\dfrac{x+\sec x\tan x}{\sqrt{x^{2}-2\sec x}}$

54) If $y=(3x^{2}+1)^{6}$, then $y'=$

$\boxed{a}$ $6(3x^{2}+1)^{6}$ $\boxed{b}$ $36x(3x^{2}+1)^{5}$ Θ

$\boxed{c}$ $36(3x^{2}+1)^{5}$ $\boxed{d}$ $6x(3x^{2}+1)^{5}$

55) If $xy+\tan x=2x^{3}+\sin y$, then $y'=$

$\boxed{a}$ $\dfrac{6x^{2}-y-\sec^{2}x}{x-\cos y}$ Θ $\boxed{b}$ $\dfrac{6x^{2}+y-\sec^{2}x}{x-\cos y}$

$\boxed{c}$ $\dfrac{6x^{2}-y+\sec^{2}x}{x-\cos y}$ $\boxed{d}$ $\dfrac{x-\cos y}{6x^{2}-y-\sec^{2}x}$

56) If $y = x^{-1}\sec x$, then $y' =$	
$\boxed{a}$ $-x^{-2}\sec x + x^{-1}\sec x\tan x$ Θ	$\boxed{b}$ $x^{-2}\sec x - x^{-1}\sec x\tan x$
$\boxed{c}$ $-x^{-2}\sec x - x^{-1}\sec x\tan x$	$\boxed{d}$ $x^{-2}\sec x + x^{-1}\sec x\tan x$

57) If $y = \sin^{-1}\left(x^3\right)$, then $y' =$

$\boxed{a}$ $\dfrac{3x^2}{\sqrt{1-x^6}}$ Θ $\boxed{b}$ $-\dfrac{3x^2}{\sqrt{1-x^6}}$ $\boxed{c}$ $-\dfrac{3x^2}{\sqrt{1-x^5}}$ $\boxed{d}$ $\dfrac{3x^2}{\sqrt{1-x^5}}$

58) If $y = \cos^{-1}\left(x^3\right)$, then $y' =$

$\boxed{a}$ $\dfrac{3x^2}{\sqrt{1-x^6}}$ $\boxed{b}$ $-\dfrac{3x^2}{\sqrt{1-x^6}}$ Θ $\boxed{c}$ $-\dfrac{3x^2}{\sqrt{1-x^5}}$ $\boxed{d}$ $\dfrac{3x^2}{\sqrt{1-x^5}}$

59) If $y = \sec^{-1}\left(x^3\right)$, then $y' =$

$\boxed{a}$ $\dfrac{3}{x\sqrt{x^5-1}}$ $\boxed{b}$ $-\dfrac{3}{x\sqrt{x^5-1}}$ $\boxed{c}$ $-\dfrac{3}{x\sqrt{x^6-1}}$ $\boxed{d}$ $\dfrac{3}{x\sqrt{x^6-1}}$ Θ

60) If $y = \sec^{-1}\left(x^3\right)$, then $y' =$

$\boxed{a}$ $\dfrac{3}{x\sqrt{x^5-1}}$ $\boxed{b}$ $-\dfrac{3}{x\sqrt{x^5-1}}$ $\boxed{c}$ $-\dfrac{3}{x\sqrt{x^6-1}}$ Θ $\boxed{d}$ $\dfrac{3}{x\sqrt{x^6-1}}$

61) If $y = \ln(x^3 - 2\sec x)$, then $y' =$

$\boxed{a}$ $\dfrac{x^2 - 2\sec x\tan x}{x^3 - 2\sec x}$ $\boxed{B}$ $\dfrac{3x^2 - 2\sec x\tan x}{x^3 - 2\sec x}$ Θ

$\boxed{c}$ $\dfrac{3x^2 - 2\sec x}{x^3 - 2\sec x}$ $\boxed{d}$ $\dfrac{3x^2 + 2\sec x\tan x}{x^3 - 2\sec x}$

62) If $y = \ln(\cos x)$, then $y' =$

$\boxed{a}$ $\tan x$ $\boxed{b}$ $-\tan x$ Θ $\boxed{c}$ $\cot x$ $\boxed{d}$ $-\cot x$

63) If $y = \ln(\sin x)$, then $y' =$

$\boxed{a}$ $\tan x$ $\boxed{b}$ $-\tan x$ $\boxed{c}$ $\cot x$ Θ $\boxed{d}$ $-\cot x$

64) If $y = \ln\sqrt{3x^2 + 5x}$, then $y' =$

$\boxed{a}$ $\dfrac{6x+5}{3x^2+5x}$ $\boxed{b}$ $\dfrac{6x+5}{2(3x^2+5x)}$ Θ

$\boxed{c}$ $\dfrac{6x+5}{(3x^2+5x)\ln 5}$ $\boxed{d}$ $\dfrac{6x}{2(3x^2+5x)}$

65) If $y = \log_5(x^3 - 2\csc x)$, then $y' =$

$\boxed{a}$ $\dfrac{3x^2 + 2\csc x \cot x}{x^3 - 2\csc x \ln 5}$ $\boxed{b}$ $\dfrac{3x^2 - 2\csc x \cot x}{\left(x^3 - 2\csc x\right)\ln 5}$

$\boxed{c}$ $\dfrac{3x^2 + 2\csc x \cot x}{x^3 - 2\csc x}$ $\boxed{d}$ $\dfrac{3x^2 + 2\csc x \cot x}{\left(x^3 - 2\csc x\right)\ln 5}$ Θ

66) If $y = \ln\dfrac{x-1}{\sqrt{x+2}}$, then $y' =$

$\boxed{a}$ $\dfrac{x+5}{2(x-1)(x-2)}$ Θ $\boxed{b}$ $\dfrac{x+5}{(x-1)(x-2)}$

$\boxed{c}$ $\dfrac{x-5}{2(x-1)(x-2)}$ $\boxed{d}$ $\dfrac{x}{2(x-1)(x-2)}$

67) If $y = 2x^3 - \sin x$, then $y' =$

$\boxed{a}$ $6x^2 + \cos x$ $\boxed{b}$ $6x^2 - \cos x$ Θ $\boxed{c}$ $3x^2 - \cos x$ $\boxed{d}$ $6x^2 - \sin x$

68) If $y = x^3 \cos x$, then $y' =$

$\boxed{a}$ $3x^2 \cos x - x^3 \sin x$ Θ $\boxed{b}$ $3x^2 \cos x + x^3 \sin x$

$\boxed{c}$ $3x^4 \cos x - x^3 \sin x$ $\boxed{d}$ $3x^2 \sin x$

69) If $y = x^{\sqrt{x}}$, then $y' =$

$\boxed{a}$ $x^{\sqrt{x}}\left(\dfrac{1+\ln x}{\sqrt{x}}\right)$ $\boxed{b}$ $x^{\sqrt{x}}\left(\dfrac{2+\ln x}{2\sqrt{x}}\right)$ Θ $\boxed{c}$ $\left(\dfrac{2+\ln x}{2\sqrt{x}}\right)$ $\boxed{d}$ $x\left(\dfrac{2+\ln x}{2\sqrt{x}}\right)$

70) If $y = \left(\sin x\right)^x$, then $y' =$

$\boxed{a}$ $(\sin x)^x \left(\ln(\sin x) - x \tan x\right)$ Θ $\boxed{b}$ $(\sin x)^x \left(\ln(\sin x) + x \tan x\right)$

$\boxed{c}$ $(\sin x)^x \left(\ln(\sin x) - x \cot x\right)$ $\boxed{d}$ $\ln(\sin x) - x \tan x$

71) If $y = \log_7(x^3 - 2)$, then $y' =$

$\boxed{a}$ $\dfrac{x^2}{\left(x^3-2\right)\ln 7}$ $\boxed{b}$ $\dfrac{3x^2}{x^3-2}$ $\boxed{c}$ $\dfrac{1}{\left(x^3-2\right)\ln 7}$ $\boxed{d}$ $\dfrac{3x^2}{\left(x^3-2\right)\ln 7}$ Θ

72) If $y = \cos(x^5)$, then $y' =$

$\boxed{a}$ $5x^4 \sin(x^5)$ $\boxed{b}$ $5\sin^4(x)$

$\boxed{c}$ $-5x^4 \sin(x^5)$ Θ $\boxed{d}$ $x^5 \sin x + 5x^4 \sin x$

73) If $y = \sec x \tan x$, then $y' =$

$\boxed{a}$ $\sec x^3 + \sec x \tan^2 x$ $\boxed{b}$ $\sec^3 x + \sec x \tan^2 x$ Θ

$\boxed{c}$ $\sec^3 x + \sec x \tan x^2$ $\boxed{d}$ $\sec^3 x - \sec x \tan^2 x$

74) $D^{99}(\cos x) =$

$\boxed{a}$ $\sin x$ Θ $\boxed{b}$ $\cos x$ $\boxed{c}$ $-\sin x$ $\boxed{d}$ $-\cos x$

75) If $y = (x + \sec x)^3$, then $y' =$

$\boxed{a}$ $3(x + \sec x)^2(1 + \tan x)$ $\boxed{b}$ $3(x + \sec x)^2(1 + \sec x \tan x)$ Θ

$\boxed{c}$ $(x + \sec x)^2(1 + \sec x \tan x)$ $\boxed{d}$ $\frac{1}{4}(x + \sec x)^4(1 + \sec x \tan x)$

76) If $x^2 = 5y^2 + \sin y$, then $y' =$

$\boxed{a}$ $\dfrac{2}{10y + \cos y}$ $\boxed{b}$ $\dfrac{2x}{10y - \cos y}$ $\boxed{c}$ $\dfrac{2x}{10y + \cos y}$ Θ $\boxed{d}$ $\dfrac{x}{5y + \cos y}$

77) If $x^2 - 5y^2 + \sin y = 0$, then $y' =$

$\boxed{a}$ $\dfrac{2}{10y + \cos y}$ $\boxed{b}$ $\dfrac{2x}{10y - \cos y}$ Θ $\boxed{c}$ $\dfrac{2x}{10y + \cos y}$ $\boxed{d}$ $\dfrac{x}{5y + \cos y}$

78) If $y = \sin x \sec x$, then $y' =$

$\boxed{a}$ $\sin x \tan x + 1$ $\boxed{b}$ $\sec^2 x$ Θ $\boxed{c}$ $\sin x \tan x - 1$ $\boxed{d}$ $\sin x \sec x \tan x - 1$

79) If $f(x) = \sin^2(x^3 + 1)$, then $f'(x) =$

$\boxed{a}$ $6x^2 \sin(x^3 + 1)\cos(x^3 + 1)$ Θ $\boxed{b}$ $3x^2 \sin(x^3 + 1)\cos(x^3 + 1)$

$\boxed{c}$ $-6x^2 \sin(x^3 + 1)\cos(x^3 + 1)$ $\boxed{d}$ $2x^2 \sin(x^3 + 1)\cos(x^3 + 1)$

80) If $y = (x + \cot x)^3$, then $y' =$

$\boxed{a}$ $3(x + \cot x)^2(1 + \csc^2 x)$ $\boxed{b}$ $3(x + \cot x)^2(1 - \csc^2 x)$ Θ

$\boxed{c}$ $-3(x + \cot x)^2(1 - \csc^2 x)$ $\boxed{d}$ $(x + \cot x)^2(1 - \csc^2 x)$

81) If $y = \tan^{-1}\left(\dfrac{x}{2}\right)$, then $y' =$

$\boxed{a}$ $\dfrac{4}{4 + x^2}$ $\boxed{b}$ $\dfrac{2}{4 + x^2}$ Θ $\boxed{c}$ $-\dfrac{2}{4 + x^2}$ $\boxed{d}$ $\dfrac{1}{\sqrt{4 - x^2}}$

82) If $y = \cot^{-1}\left(\dfrac{x}{2}\right)$, then $y' =$

$\boxed{a}$ $\dfrac{4}{4+x^2}$ $\boxed{b}$ $\dfrac{2}{4+x^2}$ $\boxed{c}$ $-\dfrac{2}{4+x^2}$ Θ $\boxed{d}$ $\dfrac{1}{\sqrt{4-x^2}}$

83) If $y = \sin^{-1}\left(\dfrac{x}{3}\right)$, then $y' =$

$\boxed{a}$ $\dfrac{3}{\sqrt{9+x^2}}$ $\boxed{b}$ $\dfrac{x}{\sqrt{9-x^2}}$ $\boxed{c}$ $-\dfrac{1}{\sqrt{9-x^2}}$ $\boxed{d}$ $\dfrac{1}{\sqrt{9-x^2}}$ Θ

84) If $y = \cos^{-1}\left(\dfrac{x}{3}\right)$, then $y' =$

$\boxed{a}$ $\dfrac{3}{\sqrt{9+x^2}}$ $\boxed{b}$ $\dfrac{x}{\sqrt{9-x^2}}$ $\boxed{c}$ $-\dfrac{1}{\sqrt{9-x^2}}$ Θ $\boxed{d}$ $\dfrac{1}{\sqrt{9-x^2}}$

85) $D^{99}(\sin x) =$

$\boxed{a}$ $\sin x$ $\boxed{b}$ $\cos x$ $\boxed{c}$ $-\sin x$ $\boxed{d}$ $-\cos x$ Θ

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