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King Abdul Aziz University	Faculty of Sciences	Mathematics Department
Math 110 Spring 2012	Final (40 Marks)	Time 120 m

Student Name: Student Number: $\boxed{A}$

1) $D^{120}(\sin x) =$

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

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

$\boxed{a}$ $x^{\tan x}\left[\dfrac{\tan x}{x} - \csc^2 x \ln x\right]$ $\boxed{b}$ $x^{\tan x}\left[\dfrac{\tan x}{x} - \sec^2 x \ln x\right]$

$\boxed{c}$ $x^{\tan x}\left[\dfrac{\tan x}{x} + \sec^2 x \ln x\right]$ $\boxed{d}$ $x^{\tan x}\left[\dfrac{\tan x}{x} + \csc^2 x \ln x\right]$

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

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

4) If $y = \log_5 \sqrt{x^3+5}$, then $y' =$

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

5) If $y^3 + 2\sin y - 3x^2 - 5 = 0$, then $y' =$

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

6) If $f(x) = x - 2$, and $g(x) = x - 3$, then $(fg)(x) =$

$\boxed{a}$ $x^2 + 5x + 6$ $\boxed{b}$ $x^2 + 7x + 6$ $\boxed{c}$ $x^2 - 5x + 6$ $\boxed{d}$ $x^2 - 7x + 6$

7) $\lim\limits_{x\to\infty} \dfrac{3^x}{5^x} =$ $\left(\lim\limits_{x\to\infty} a^x = \infty, a > 1, \lim\limits_{x\to\infty} a^x = 0, 0 < a < 1\right)$

$\boxed{a}$ ∞ $\boxed{b}$ 1 $\boxed{c}$ does not exist $\boxed{d}$ 0

8) If $y = 3^{\csc x} + e^{-x^2}$, then $y' =$

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

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

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

$\boxed{a}$ $\dfrac{1}{\sqrt{x}} + \dfrac{1}{x^4}$ $\boxed{b}$ $\dfrac{1}{\sqrt{x}} - \dfrac{1}{x^4}$

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

10) If $y=\tan^{-1}(x)+\cos^{-1}(e^x)$, then $y'=$

$\boxed{a}$ $-\dfrac{1}{1+x^2}-\dfrac{e^x}{\sqrt{1-e^{2x}}}$ $\boxed{b}$ $\dfrac{1}{1+x^2}+\dfrac{e^x}{\sqrt{1-e^{2x}}}$

$\boxed{c}$ $\dfrac{1}{1+x^2}-\dfrac{e^x}{\sqrt{1-e^{2x}}}$ $\boxed{d}$ $-\dfrac{1}{1+x^2}+\dfrac{e^x}{\sqrt{1-e^{2x}}}$

11) $\lim\limits_{x\to1}\dfrac{5-5x}{\ln x}=$

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

12) $\csc\left(\cos^{-1}\left(\dfrac{4}{5}\right)\right)=$

$\boxed{a}$ $\dfrac{5}{3}$ $\boxed{b}$ $\dfrac{3}{5}$ $\boxed{c}$ $\dfrac{3}{4}$ $\boxed{d}$ $\dfrac{4}{3}$

13) The number c in $(0,3)$ which make the function $f(x)=x^2+3x-4$ satisfy Mean Value Theorem on $[0,3]$ is

$\boxed{a}$ $-\dfrac{3}{2}$ $\boxed{b}$ $-\dfrac{1}{2}$ $\boxed{c}$ $\dfrac{1}{2}$ $\boxed{d}$ $\dfrac{3}{2}$

14) $\lim\limits_{x\to1}\dfrac{x^2+x-2}{3x^2-2x-1}=$

$\boxed{a}$ does not exist $\boxed{b}$ 1 $\boxed{c}$ $\dfrac{3}{4}$ $\boxed{d}$ $\dfrac{4}{3}$

15) If $f(x)=\sqrt{x}$, and $g(x)=\tan x^2$, then $(g\circ f)(x)=$

$\boxed{a}$ $\sqrt{\tan x}$ $\boxed{b}$ $\tan x$ $\boxed{c}$ $\sqrt{\tan x^2}$ $\boxed{d}$ $\tan\sqrt{x}$

16) Find the range of the function $f(x)=\sqrt{x-3}$.

$\boxed{a}$ $(-\infty,0]$ $\boxed{b}$ $\mathbb{R}=(-\infty,\infty)$ $\boxed{c}$ $[3,\infty)$ $\boxed{d}$ $[0,\infty)$

17) The inverse of the function $f(x)=2x+3$ is

$\boxed{a}$ $f^{-1}(x)=\dfrac{x-3}{2}$ $\boxed{b}$ $f^{-1}(x)=\dfrac{x+3}{2}$

$\boxed{c}$ $f^{-1}(x)=\dfrac{1}{x-3}$ $\boxed{d}$ $f^{-1}(x)=\dfrac{1}{x+3}$

18) If $y=x\cos^3(2x)$, then $y'=$

$\boxed{a}$ $\cos^2(2x)[\cos(2x)-3x\sin(2x)]$ $\boxed{b}$ $\cos^2(2x)[\cos(2x)+6x\sin(2x)]$

$\boxed{c}$ $\cos^2(2x)[\cos(2x)-6\sin(2x)]$ $\boxed{d}$ $\cos^2(2x)[\cos(2x)-6x\sin(2x)]$

19) $\frac{4\pi}{3}$ rad =

$\boxed{a}$ 120^0 $\boxed{b}$ 150^0 $\boxed{c}$ 240^0 $\boxed{d}$ 300^0

20) The tangent line equation to the curve of $f(x)=\frac{x}{x-2}$ at the point $(1,-1)$ is

$\boxed{a}$ $y=2x-3$ $\boxed{b}$ $y=-2x-1$

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

21) The critical numbers of the function $f(x)=x^3+3x^2-9x+5$ are

$\boxed{a}$ $-1,3$ $\boxed{b}$ $-3,1$ $\boxed{c}$ ± 3 $\boxed{d}$ ± 1

22) The function $f(x)=x^3+3x^2-9x+5$ is decreasing on

$\boxed{a}$ $(-1,3)$ $\boxed{b}$ $(-3,1)$ $\boxed{c}$ $(-\infty,-3)\cup(1,\infty)$ $\boxed{d}$ $(-\infty,-1)\cup(3,\infty)$

23) The function $f(x)=x^3+3x^2-9x+5$ is increasing on

$\boxed{a}$ $(-1,3)$ $\boxed{b}$ $(-3,1)$ $\boxed{c}$ $(-\infty,-3)\cup(1,\infty)$ $\boxed{d}$ $(-\infty,-1)\cup(3,\infty)$

24) The function $f(x)=x^3+3x^2-9x+5$ has a relative minimum value at the point

$\boxed{a}$ $(1,0)$ $\boxed{b}$ $(-3,22)$ $\boxed{c}$ $(1,1)$ $\boxed{d}$ $(-3,32)$

25) The function $f(x)=x^3+3x^2-9x+5$ has a relative maximum value at the point

$\boxed{a}$ $(1,0)$ $\boxed{b}$ $(-3,22)$ $\boxed{c}$ $(1,1)$ $\boxed{d}$ $(-3,32)$

26) The function $f(x)=x^3+3x^2-9x+5$ has an inflection point at

$\boxed{a}$ $(-1,16)$ $\boxed{b}$ $(1,16)$ $\boxed{c}$ $(-1,10)$ $\boxed{d}$ $(1,0)$

27) The graph of $f(x)=x^3+3x^2-9x+5$ concave downward on

$\boxed{a}$ $(-1,\infty)$ $\boxed{b}$ $(1,\infty)$ $\boxed{c}$ $(-\infty,-1)$ $\boxed{d}$ $(-\infty,1)$

28) The graph of $f(x)=x^3+3x^2-9x+5$ concave upward on

$\boxed{a}$ $(-1,\infty)$ $\boxed{b}$ $(1,\infty)$ $\boxed{c}$ $(-\infty,-1)$ $\boxed{d}$ $(-\infty,1)$

29) Find the domain of the function $f(x)=\frac{x+5}{x^2-7x+6}$.

$\boxed{a}$ $\mathbb{R}\setminus\{1,6\}$ $\boxed{b}$ $\mathbb{R}\setminus\{2,3\}$ $\boxed{c}$ $\mathbb{R}\setminus\{-3,-2\}$ $\boxed{d}$ $\mathbb{R}\setminus\{-6,-1\}$

30) The solution of the inequality $|x-4|\geq 3$ is

$\boxed{a}$ $[1,7]$ $\boxed{b}$ $(1,7)$

$\boxed{c}$ $(-\infty,1)\cup(7,\infty)$ $\boxed{d}$ $(-\infty,1]\cup[7,\infty)$

31) $\lim_{x\to 0}\frac{\sin(5x)}{\sin(3x)}=$

$\boxed{a}$ $\frac{3}{5}$ $\boxed{b}$ 3 $\boxed{c}$ 5 $\boxed{d}$ $\frac{5}{3}$

32) If $f(x)=7x^2$, then $f'(x)=$			
$\boxed{a}$ $\lim\limits_{x\to 0}\dfrac{7(x+h)^2+(7x^2)}{h}$		$\boxed{b}$ $\lim\limits_{h\to 0}\dfrac{7(x+h)^2+(7x^2)}{h}$	
$\boxed{c}$ $\lim\limits_{h\to 0}\dfrac{7(x+h)^2-(7x^2)}{h}$		$\boxed{d}$ $\lim\limits_{x\to 0}\dfrac{7(x+h)^2-(7x^2)}{h}$	
33) The function $f(x)=\dfrac{x^3}{x^2+5}$ is			
$\boxed{a}$ Even	$\boxed{b}$ Odd	$\boxed{c}$ Even and odd	$\boxed{d}$ Neither even nor odd
34) The horizontal asymptote of $f(x)=\dfrac{x+1}{3x+1}$ is			
$\boxed{a}$ $y=-\dfrac{1}{3}$	$\boxed{b}$ $x=\dfrac{1}{3}$	$\boxed{c}$ $x=-\dfrac{1}{3}$	$\boxed{d}$ $y=\dfrac{1}{3}$
35) If $y=\left(2x^2-1\right)^5$, then $y'=$			
$\boxed{a}$ $5\left(2x^2-1\right)^4$	$\boxed{b}$ $5x\left(2x^2-1\right)^4$	$\boxed{c}$ $20x\left(2x^2-1\right)^4$	$\boxed{d}$ $20\left(2x^2-1\right)^4$
36) The vertical asymptote of $f(x)=\dfrac{x+1}{3x+1}$ is			
$\boxed{a}$ $y=-\dfrac{1}{3}$	$\boxed{b}$ $x=\dfrac{1}{3}$	$\boxed{c}$ $x=-\dfrac{1}{3}$	$\boxed{d}$ $y=\dfrac{1}{3}$
37) The equation of the line passes through the points $(5,-2)$ and $(3,4)$ is			
$\boxed{a}$ $y=-3x+17$	$\boxed{b}$ $y=-3x+13$	$\boxed{c}$ $y=3x+4$	$\boxed{d}$ $y=3x-13$
38) function $f(x)=\cos^{-1}(x-5)$ is continuous on			
$\boxed{a}$ $[4,6]$	$\boxed{b}$ $(-6,-4)$	$\boxed{c}$ $(4,6)$	$\boxed{d}$ $[-6,-4]$
39) The absolute maximum point of $f(x)=3x^2-12x+1$ in $[0,3]$ is			
$\boxed{a}$ $(2,-11)$	$\boxed{b}$ $(0,2)$	$\boxed{c}$ $(2,-13)$	$\boxed{d}$ $(0,1)$
40) The absolute minimum point of $f(x)=3x^2-12x+1$ in $[0,3]$ is			
$\boxed{a}$ $(2,-11)$	$\boxed{b}$ $(0,2)$	$\boxed{c}$ $(2,-13)$	$\boxed{d}$ $(0,1)$