King Abdul Aziz University Faculty of Sciences Mathematics Department

Final Test Fall 2008-2009 Math 110 Time: 2 Hours B

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1) If $y=\cos(2x^3)$, then $y'=$ $-\sin(2x^3) * 6x^2$

A $6x^2\sin(2x^3)$ B $-6x^2\sin(2x^3)$ $-6x^2\sin(2x^3)$

C $-6\sin(2x^3)$ D $-6x\sin(2x^3)$

2) $\lim\limits_{x\to 3}\dfrac{x^2-9}{x^2-5x+6}=$ $\dfrac{9-9}{9-15+6}=\dfrac{0}{0}$ $\dfrac{(\cancel{x-3})(x+3)}{(\cancel{x-3})(x-2)}$ $\dfrac{x+3}{x-2}$

A $\dfrac{1}{6}$ B 0 C 6 D does not exist $6=\dfrac{6}{1}=\dfrac{3+3}{3-2}$

3) The vertical asymptote of $f(x)=\dfrac{x+3}{x^2-25}$ are $(x-5)(x+5)$ $\boxed{x=+5}$ $\boxed{x=-5}$

A $x=\pm 5$ B $y=0$ C $y=\pm 5$ D $x=3$

4) $\int_0^2 (x^{3+1}+1x)\,dx=$ $\dfrac{x^4}{4}+x$ $\boxed{\dfrac{32}{4}+2}$ $4+2=6-$ $6-0=6$

A -2 B 2 C -6 D 6

5) $\int\dfrac{1}{1-\sin^2 x}\,dx=$ $\sin^2 x=\frac{1}{2}(1-\cos 2x)$ $\boxed{\cos^2 x}=1-\sin^2 x$ $\dfrac{1}{\cos x * \cos x}$ $\dfrac{1}{\cos^2}$

$(\cos x)^{-2}$ $\dfrac{(\cos x)^{-1}}{-1}$ $\dfrac{-1}{\cos x}+C$ $\csc^2 x$

A $-\tan x+C$ B $\tan x+C$

C $-\cot x+C$ D $\cot x+C$

6) If $x=150^\circ$, then $x=$ $(\cos x)^{-2+1}$

A $\dfrac{2\pi}{3}$ B $\dfrac{5\pi}{6}$ $\tan=\dfrac{\sin}{\cos}$ $\dfrac{(\cos x)^{1}}{-1}$ $\dfrac{-1}{\cos x} * \sin x + C$ $-\cot x$ $\sec^2 x$

C $\dfrac{3\pi}{2}$ D $\dfrac{4\pi}{3}$ $\cot$ $-\dfrac{\sin x}{\cos x}$

7) If $y=2x^3-5x+1$, then $y'=$ $6x^2-5$ $\tan$

A $2x^2+5x+1$ B $6x^2+5$

C $-6x^2-5$ D $6x^2-5$

8) $\int\sec^2\underbrace{(3x^2-2x)}_{u}\underbrace{(3x-1)}_{du}\,dx=$ $\int \sec^2(u)\cdot du$ $\tan(u)$

A $-\tan(3x^2-2x)+C$ B $\tan(3x^2-2x)+C$

C $-\dfrac{1}{2}\tan(3x^2-2x)+C$ D $\dfrac{1}{2}\tan(3x^2-2x)+C$

x^{-2} x^{-1} tan sec $- x^{-2}$ sec

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

$\boxed{A}$ $-x^{-2}\sec x + x^{-1}\sec x\tan x$ $\boxed{B}$ $x^{-2}\sec x - x^{-1}\sec x\tan x$

$\boxed{C}$ $-x^{-2}\sec x - x^{-1}\sec x\tan x$ $\boxed{D}$ $x^{-2}\sec x + x^{-1}\sec x\tan x$

10) $\lim_{x\to 9}\frac{x-9}{\sqrt{x}-3} = \frac{\sqrt{x}+3}{\sqrt{x}+3\sqrt{x}}$ $\frac{1}{1} * \frac{1}{2\sqrt{x}}$ $2\sqrt{x} = 6$

$\frac{\sqrt{x}+3}{x-9} = 6$

$\boxed{A}$ 0 $\boxed{B}$ 6 $\boxed{C}$ $\frac{1}{6}$ $\boxed{D}$ does not exist

11) The tangent line equation of the graph of $f(x) = 2x^2 + 3$ at $(-1,5)$ is : $4x = (m=-4)$ $y = m(x - x_0) + y_0$

$\boxed{A}$ $y = -4x + 1$ $\boxed{B}$ $y = 4x + 1$ $y = -4(x+1) + 5$

$\boxed{C}$ $y = -4x - 9$ $\boxed{D}$ $y = -4x + 6$ $y = -4x - 4 + 5$

$-4x + 1$

12) The domain of $f(x) = \sqrt{4 - x^2}$ is $4 - x^2 \geq 0$

$\boxed{A}$ $(-\infty,-2)\cup(2,\infty)$ $\boxed{B}$ $(-\infty,-2]\cup[2,\infty)$ $\sqrt{4} \geq \sqrt{x^2}$ -2 2

$\boxed{C}$ $[-2,2]$ $\boxed{D}$ $(-2,2)$ $2 \geq x \geq -2$

13) If $y = \sec x\tan x$, then $y' =$ tan sec tan + $\sec^2$ sec

$\tan^2$ sec + $\sec^3$

$\boxed{A}$ $\sec^3 x + \sec x\tan^2 x$ $\boxed{B}$ $\sec x^3 + \sec x\tan^2 x$

$\boxed{C}$ $\sec^3 x - \sec x\tan^2 x$ $\boxed{D}$ $\sec^3 x + \sec x\tan x^2$

14) $\int x\sqrt{x-3}\,dx =$ $x(x-3)^{1/2}$ $u = x-3$ $x^{3/2} - 3x^{1/2}$

$(u+3)\sqrt{u}$ $x\int\sqrt{u}\,du$

$\boxed{A}$ $\frac{5}{2}(x-3)^{5/2} + 2(x-3)^{3/2} + C$ $\boxed{B}$ $(x-3)^{5/2} + (x-3)^{3/2} + C$

$\boxed{C}$ $\frac{2}{5}(x-3)^{5/2} + 2(x-3)^{3/2} + C$ $\boxed{D}$ $\frac{x^2(x-3)^{3/2}}{3}$

15) The solution set of $2x - 3 \geq -15$ is $2x \geq -15 + 3$

$\boxed{A}$ $[-6,\infty)$ $\boxed{B}$ $(-\infty,-6]$ $\frac{2x}{2} \geq \frac{-12}{2}$

$\boxed{C}$ $(-\infty,-6)$ $\boxed{D}$ $(-6,\infty)$ -6 ∞ $x \geq -6$

16) If $y = \frac{x}{x-7}$, then $y' =$ $\frac{(1*(x-7)) - (1*(x))}{(x-7)^2}$

$\boxed{A}$ $-7x(x+7)^{-2}$ $\boxed{B}$ $-x(x+7)^{-2}$ $\frac{x-7-x}{(x-7)^2}$ $-7(x-7)^{-2}$

$\boxed{C}$ $-7(x+7)^{-2}$ $\boxed{D}$ $7(x+7)^{-2}$

17) $\lim\limits_{x\to\infty}\dfrac{3x^{5}-x}{x^{3}-3}=$ $\quad \frac{3x^5}{x^3} + 3x^{2}$

A $-\infty$ B 0 C ∞ D 3

18) If $y=\sqrt{x^{2}-2\sec x}$, then $y'=$ $\quad \dfrac{(2x-2(\tan \sec))}{2\sqrt{x^2-2\sec}}$

A $\dfrac{x-\sec x\tan x}{2\sqrt{x^{2}-2\sec x}}$ B $\dfrac{x+\sec x\tan x}{2\sqrt{x^{2}-2\sec x}}$

C $\dfrac{x-\sec x\tan x}{\sqrt{x^{2}-2\sec x}}$ D $\dfrac{x+\sec x\tan x}{\sqrt{x^{2}-2\sec x}}$ $\quad \dfrac{2(x-(\tan\sec))}{2\sqrt{x^2-2\sec}}$

19) Let $f(x)=x^{2}+1$, and $g(x)=x^{2}-2$. Then $(fg)(x)=$ $x^4-2x^2+x^2-2$

x^4-x^2-2

A $x^{4}-x^{2}-2$ B $x^{4}+x^{2}-2$

C $x^{4}-3x^{2}-2$ D $x^{4}-x^{2}+x-2$

20) The solution of $|x-2|\le 5$ is $\quad -5+2 \le x-2+2 \le 5+2 \quad -3\le x\le 7$

A $(-3,7)$ B $[-3,7]$

C $(-\infty,-3]\cup[7,\infty)$ D $(-\infty,-7]\cup[3,\infty)$

21) $\int (x-2)(x+3)dx=$ $\int x^2+3x-2x-6 = \int x^{2+1}+x-6$

A $\dfrac{x^{3}}{3}+\dfrac{x^{2}}{2}-6x+C$ B $\dfrac{x^{3}}{3}+x^{2}-6x+C$ $\quad \dfrac{x^3}{3}+\dfrac{x^2}{2}-6x+C$

C $\dfrac{(x-2)^{2}(x+3)^{2}}{4}+C$ D $\dfrac{x^{3}}{3}+\dfrac{x^{2}}{2}+C$

22) If $x>0$, then $\int\dfrac{\sqrt{x^{3}-x^{2}}}{x}dx=$ $(x^3-x^2)^{1/2} * x^{-1}$

A $\dfrac{2}{3}\sqrt{(x-1)^{3}}+C$ B $-\dfrac{3}{2}\sqrt{(x-1)^{3}}+C$

C $-\dfrac{2}{3}\sqrt{(x-1)^{3}}+C$ D $\dfrac{3}{2}\sqrt{(x-1)^{3}}+C$

23) The slope of the line perpendicular to the line $y=\dfrac{1}{5}x+3$ is $\quad m_1\cdot m_2=-1$

A $\dfrac{1}{5}$ B $-\dfrac{1}{5}$ C 5 D -5 $\quad \frac{1}{5}m_2=-1 \quad m_2=-5$

24) Let $f(x)=\sqrt{x}$, and $g(x)=\cot x^{2}$. Then $(g\circ f)(x)=$

A $\sqrt{\cot x}$ B $\cot x^{2}$ C $\sqrt{\cot x^{2}}$ D $\cot x$

25) The intersection point of the line $y = 2x - 5$ and the line $y = x + 1$ are

$2x - 5 = x + 1 \quad 2x - x = 1 + 5 \quad \boxed{x = 6}$

[A] $(-4,-3)$ [B] $(6,-7)$ [C] $(6,5)$ [D] $(6,7)$

26) $\int (2x^{-3} + \sqrt{x})dx =$ $\quad \frac{2x^{-2}}{-2} \quad -x^{-2} + \frac{x^{3/2}}{3/2} \quad -x^{-2} + \frac{2}{3}\sqrt{x^3} + C$

[A] $-x^{-2} + \frac{2}{3}\sqrt{x^3} + C$ [B] $x^{-2} + \frac{2}{3}\sqrt{x^3} + C$

[C] $x^{-2} + \frac{3}{2}\sqrt{x^3} + C$ [D] $-x^{-2} + \frac{3}{2}\sqrt{x^3} + C$

27) If $y = (3x^2 + 1)^6$, then $y' =$ $6(3x^2+1)^5 * 6x$

$36x(3x^2+1)^5$

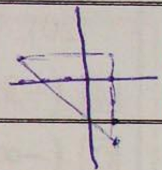
[A] $6(3x^2 + 1)^6$ [B] $36x(3x^2 + 1)^5$

[C] $36(3x^2 + 1)^5$ [D] $6x(3x^2 + 1)^5$

$4^2 + 4^2$

$16 + 16 = 32$

28) The distance between the points $(1,-3)$ and $(-3,1)$ is



[A] $4\sqrt{2}$ [B] $\sqrt{6}$ [C] $\pm 4\sqrt{2}$ [D] $-4\sqrt{2}$

29) $\int (x^2 - 3x)^{12}(2x - 3)dx =$ $\int \frac{(u)^{12+1}}{12+1} du \quad \frac{(u)^{13}}{13}$

[A] $(x^2 - 3x)^{13} + C$ [B] $\frac{(x^2 - 3x)^{13}}{13} + C$ $\quad \frac{(x^2 - 3x)^{13}}{13} + C$

[C] $12(x^2 - 3x + 1)^{11} + C$ [D] $\frac{(x^2 - 3x)^{13}}{13}$

1 3 2 1 60 0 -1 -2 -3 -1 0 270 1

30) The solution of the equation $x^2 + x - 6 = 0$ is

[A] -2 or 3 [B] -3 or 2

[C] -1 or 6 [D] -6 or 1

$(x + 3)(x - 2) = 0$

$x = -3 \quad x = 2$

31) $\lim_{x \to \frac{\pi}{6}} \sin(-x) =$ $\quad \sin(330) \quad 0$

$\sin(270 + 60) = \cos 270 * \sin 60 + \cos 60 * \sin$

$\frac{1}{2} * -1$

$-\frac{1}{2}$

[A] $\frac{\sqrt{3}}{2}$ [B] $\frac{1}{2}$ [C] $-\frac{1}{2}$ [D] $-\frac{\sqrt{3}}{2}$

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

[A] $\frac{6x^2 - y - \sec^2 x}{x - \cos y}$ [B] $\frac{6x^2 + y - \sec^2 x}{x - \cos y}$

[C] $\frac{6x^2 - y + \sec^2 x}{x - \cos y}$ [D] $\frac{x - \cos y}{6x^2 - y - \sec^2 x}$

$y + y'x + \sec^2 x = 6x^2 \cos$

$y + \sec^2 x = y'x + y'6x^2\cos y$

$y + \sec^2 x = y'(-x + 6x^2\cos y)$

33) $\int \frac{x^3+x}{x}\,dx =$ $\frac{x(x^2+1)}{x}$ $\int (\frac{x^{2+1}}{2+1}+1)$

A $\frac{x^3}{3}+x+C$ B $2x+C$ $\frac{x^3}{3}+x+C$

C $\frac{x^3}{3}+x$ D x^3+3x+C

34) The function $f(x)=\frac{x^2-4}{x-3}$ is discontinuous at: $0 > x-3 \geq 0$ $x \geq 3$

A $x=2$ B $x=-2$ C $x=-3$ D $x=3$

35) $\lim\limits_{x\to -2^-} \frac{1^+}{x+2^-} = -\infty$ -2.01 $\frac{1}{-0.1}$ $\frac{1}{-0.01}$

A ∞ B $\pm\infty$ C $-\infty$ D 0

36) $\frac{d}{dx}\left(\int_0^{x^3} \cos t\, dt\right) = 3x^2 \cos x^3$

A $3t^2\cos t^3$ B $\cos x^3$ C $3x^2\cos x^3 + C$ D $3x^2\cos x^3$

37) The number c makes $f(x)=\begin{cases} cx^2-5x-2 & ;x\le 5 \\ cx+13 & ;x\ge 5\end{cases}$ continuous at $x=5$ is :

$25-2$ $50-25-2$ (cx^2-5x-2) $cx+13$ 10 23 c $(x\quad)(x\quad)$

$25c-25-2=5$
$25c=27+5$
$c=\frac{27}{25}$ 33

A -2 B $\frac{1}{2}$ C 2 D 5

$x+13$
$c18>5$
$\lim\limits_{x\to 5^+} x+13 = 18$
x^2-5x-2
$25-25-2$
18
-2

38) The function $f(x)=x^2+1$ is $cx^2-5x-2 \le 5$

A Quadratic B Cubic C Linear D Constant

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

A $\lim\limits_{h\to 0}\frac{f(x)-f(x+h)}{h}$ B $\lim\limits_{h\to 0}\frac{f(x+h)-f(x)}{h}$

C $\lim\limits_{x\to 0}\frac{f(x+h)-f(x)}{x}$ D $\lim\limits_{h\to 0}\frac{f(x+h)+f(x)}{h}$

40) $\lim\limits_{x\to 0}\frac{\sin(2x)}{5x}=$ $-\sin 2x$ $\frac{2\cos(2x)}{5}$ $\sin(x+x)=\cos x\sin x+\sin x\cos x$ $\frac{2(\sin x\cos x)}{5x}$

A $\frac{1}{10}$ B $\frac{2}{5}$ C does not exist D 0