Higher Education Ministry King Abdul-Aziz University Faculty of Science Department of Mathematics		Final Exam Spring, 2013 Math 110 - 40 Marks Time Allowed: 120 Minutes
Name	ID	A

1) $D^{71}(\cos x) =$

[a] $\sin x$ [b] $\cos x$ [c] $-\sin x$ [d] $-\cos x$

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

[a] $(x)^{x^2+1}[1+\ln x]$ [b] $(x)^{x^2+1}[1+2x\ln x]$

[c] $(x)^{x^2+1}[1+2\ln x]$ [d] $(x)^{x^2}[1+2\ln x]$

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

[a] $\dfrac{3x - \sec x \tan x}{2\sqrt{3x^2 - 2\sec x}}$ [b] $\dfrac{3x - \sec x \tan x}{\sqrt{3x^2 - 2\sec x}}$

[c] $\dfrac{3x + \sec x \tan x}{\sqrt{3x^2 - 2\sec x}}$ [d] $\dfrac{6x}{\sqrt{3x^2 - 2\sec x}}$

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

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

5) If $y^3 + 2\sin y - 3x^2 + 7 = 0$, then $y' =$

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

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

[a] $\dfrac{5}{(x-3)(x+2)}$ [b] $-\dfrac{5}{(x-3)(x+2)}$ [c] $-\dfrac{1}{(x-3)(x+2)}$ [d] $\dfrac{1}{(x-3)(x+2)}$

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

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

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

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

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

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

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

[a] $-\frac{1}{1+x^2}-\frac{e^x}{\sqrt{1-e^{2x}}}$ [b] $\frac{1}{1+x^2}+\frac{e^x}{\sqrt{1-e^{2x}}}$

[c] $\frac{1}{1+x^2}-\frac{e^x}{\sqrt{1-e^{2x}}}$ [d] $-\frac{1}{1+x^2}+\frac{e^x}{\sqrt{1-e^{2x}}}$

10) If $y=\frac{x}{x-2}$, then $y'=$

[a] $\frac{2x}{x-2}$ [b] $-\frac{2}{x-2}$ [c] $-\frac{2}{(x-2)^2}$ [d] $\frac{2}{(x-2)^2}$

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

[a] $y=2x-3$ [b] $y=-2x-1$ [c] $y=-2x+1$ [d] $y=2x+1$

12) $\csc\left(\tan^{-1}\left(\frac{1}{2}\right)\right)=$

[a] $\frac{2}{\sqrt{5}}$ [b] $\frac{1}{\sqrt{5}}$ [c] $\frac{\sqrt{5}}{2}$ [d] $\sqrt{5}$

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

[a] $-\frac{3}{2}$ [b] $-\frac{1}{2}$ [c] $\frac{1}{2}$ [d] $\frac{3}{2}$

14) $\lim_{x\to 1}\frac{x^2+x-2}{3x^2-2x-1}=$

[a] does not exist [b] 1 [c] $\frac{3}{4}$ [d] $\frac{4}{3}$

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

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

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

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

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

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

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

[a] $f^{-1}(x)=\frac{x-3}{2}$ [b] $f^{-1}(x)=\frac{x+3}{2}$

[c] $f^{-1}(x)=\frac{1}{x-3}$ [d] $f^{-1}(x)=\frac{1}{x+3}$

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

[a] $\cos^2(2x)\left[\cos(2x) - 3x\sin(2x)\right]$ [b] $\cos^2(2x)\left[\cos(2x) + 6x\sin(2x)\right]$

[c] $\cos^2(2x)\left[\cos(2x) - 6\sin(2x)\right]$ [d] $\cos^2(2x)\left[\cos(2x) - 6x\sin(2x)\right]$

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

[a] 120^0 [b] 150^0 [c] 240^0 [d] 300^0

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

[a] $-1, 3$ [b] $-3, 1$ [c] ± 3 [d] ± 1

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

[a] $(-1, 3)$ [b] $(-3, 1)$ [c] $(-\infty, -3) \cup (1, \infty)$ [d] $(-\infty, -1) \cup (3, \infty)$

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

[a] $(-1, 3)$ [b] $(-3, 1)$ [c] $(-\infty, -3) \cup (1, \infty)$ [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

[a] $(1, 0)$ [b] $(-3, 22)$ [c] $(1, 1)$ [d] $(-3, 32)$

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

[a] $(1, 0)$ [b] $(-3, 22)$ [c] $(1, 1)$ [d] $(-3, 32)$

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

[a] $(-1, 16)$ [b] $(1, 16)$ [c] $(-1, 10)$ [d] $(1, 0)$

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

[a] $(-1, \infty)$ [b] $(1, \infty)$ [c] $(-\infty, -1)$ [d] $(-\infty, 1)$

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

[a] $(-1, \infty)$ [b] $(1, \infty)$ [c] $(-\infty, -1)$ [d] $(-\infty, 1)$

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

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

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

[a] $[1, 7]$ [b] $(1, 7)$

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

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

[a] $\frac{3}{5}$ [b] 3 [c] 5 [d] $\frac{5}{3}$

32) If $f(x)=\tan(x^3)+\cot(x^2)$, then $f'(x)=$

[a] $x[3x\sec^2(x^3)+2\csc^2(x^2)]$ [b] $x[-3x\sec^2(x^3)-2\csc^2(x^2)]$

[c] $x[-3x\sec^2(x^3)+2\csc^2(x^2)]$ [d] $x[3x\sec^2(x^3)-2\csc^2(x^2)]$

33) The function $f(x)=-2x^3+5x$ is

[a] Even [b] Odd [C] Even and odd [D] Neither even nor odd

34) $\lim_{x\to 0}\dfrac{\sqrt{9+x}-3}{x}=$

[a] does not exist [b] 0 [c] 6 [d] $\dfrac{1}{6}$

35) If $y=\left(2x^2-1\right)^5$, then $y'=$

[a] $5\left(2x^2-1\right)^4$ [b] $5x\left(2x^2-1\right)^4$ [c] $20x\left(2x^2-1\right)^4$ [d] $20\left(2x^2-1\right)^4$

36) $\lim_{x\to 1^+}\dfrac{3-5x}{x-1}=$

[a] -2 [b] ∞ [c] $-\infty$ [d] 2

37) The equation of the line passes through the points $(3,4)$ and $(5,-2)$ is

[a] $y=-3x+17$ [b] $y=-3x+13$ [c] $y=3x+4$ [d] $y=3x-13$

38) function $f(x)=\cos^{-1}(x-5)$ is continuous on

[a] $[4,6]$ [B] $(-6,-4)$ [c] $(4,6)$ [d] $[-6,-4]$

39) The absolute maximum point of $f(x)=3x^2-12x+1$ in $[0,3]$ is

[a] $(2,-11)$ [B] $(0,2)$ [c] $(2,-13)$ [d] $(0,1)$

40) The absolute minimum point of $f(x)=3x^2-12x+1$ in $[0,3]$ is

[a] $(2,-11)$ [B] $(0,2)$ [c] $(2,-13)$ [d] $(0,1)$

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

[a] ± 1 [b] $-1,3$ [c] $-3,1$ [d] ± 3

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

[a] $(-\infty,-3)\cup(1,\infty)$ [b] $(-\infty,-1)\cup(3,\infty)$ [c] $(-1,3)$ [d] $(-3,1)$

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

[a] $(-\infty,-3)\cup(1,\infty)$ [b] $(-\infty,-1)\cup(3,\infty)$ [c] $(-1,3)$ [d] $(-3,1)$

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

[a] $(3,32)$ [b] $(-1,-9)$ [c] $(3,-22)$ [d] $(-1,10)$

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

[a] $(3,32)$ [b] $(-1,-9)$ [c] $(3,-22)$ [d] $(-1,10)$

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

[a] $(-\infty,1)$ [b] $(-\infty,-1)$ [c] $(1,\infty)$ [d] $(-1,\infty)$

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

[a] $(-\infty,1)$ [b] $(-\infty,-1)$ [c] $(1,\infty)$ [d] $(-1,\infty)$

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

[a] $(1,-6)$ [b] $(1,-10)$ [c] $(-1,10)$ [d] $(-1,-9)$

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

[a] $-\dfrac{1}{2\sqrt{x}}+\dfrac{1}{x^4}$ [b] $\dfrac{1}{\sqrt{x}}+\dfrac{1}{x^4}$

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

10) $D^{72}(\sin x)=$

[a] $\sin x$ [b] $\cos x$ [c] $-\sin x$ [d] $-\cos x$

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

[a] $\cos^2(2x)\left[\cos(2x)-3x\sin(2x)\right]$ [b] $\cos^2(2x)\left[\cos(2x)-6x\sin(2x)\right]$

[c] $\cos^2(2x)\left[\cos(2x)-6\sin(2x)\right]$ [d] $\cos^2(2x)\left[\cos(2x)+6x\sin(2x)\right]$

12) If $y = \cot^{-1}(x) - \sin^{-1}(e^x)$, then $y' =$

[a] $-\frac{1}{1+x^2} - \frac{e^x}{\sqrt{1-e^{2x}}}$ [b] $\frac{1}{1+x^2} + \frac{e^x}{\sqrt{1-e^{2x}}}$

[c] $\frac{1}{1+x^2} - \frac{e^x}{\sqrt{1-e^{2x}}}$ [d] $-\frac{1}{1+x^2} + \frac{e^x}{\sqrt{1-e^{2x}}}$

13) If $f(x) = \tan(x^3) - \cot(x^2)$, then $f'(x) =$

[a] $x[3x\sec^2(x^3) + 2\csc^2(x^2)]$ [b] $x[-3x\sec^2(x^3) - 2\csc^2(x^2)]$

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[c] $-3^{\sec x}\sec x\tan x - 2xe^{-x^2}$ [d] $3^{\sec x}\sec x\tan x - 2xe^{-x^2}$

15) If $y = (x)^{x^3}$, then $y' =$

[a] $(x)^{x^3+2}[1+3\ln x]$ [b] $(x)^{x^3+2}[1+3x\ln x]$

[c] $(x)^{x^3+2}[1+\ln x]$ [d] $(x)^{x^3}[1+3\ln x]$

16) If $y = \ln\frac{x-2}{x+3}$, then

[a] $\frac{5}{(x+3)(x-2)}$ [b] $-\frac{5}{(x+3)(x-2)}$ [c] $-\frac{1}{(x+3)(x-2)}$ [d] $\frac{1}{(x+3)(x-2)}$

17) The absolute maximum point of $f(x) = 3x^2 - 12x + 1$ in $[0,3]$ is

[a] $(0,2)$ [b] $(2,-11)$ [c] $(0,1)$ [d] $(2,-13)$

18) The absolute minimum point of $f(x) = 3x^2 - 12x + 1$ in $[0,3]$ is

[a] $(0,2)$ [b] $(2,-11)$ [c] $(0,1)$ [d] $(2,-13)$

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

[a] $\mathbb{R}\setminus\{1,6\}$ [b] $\mathbb{R}\setminus\{2,3\}$

[c] $\mathbb{R}\setminus\{-3,-2\}$ [d] $\mathbb{R}\setminus\{-6,-1\}$

20) The equation of the line passes through the points $(3,4)$ and $(5,-2)$ is

[a] $y = -3x + 17$ [b] $y = 3x - 13$ [c] $y = 3x + 4$ [d] $y = -3x + 13$

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

[a] $-\frac{1}{2}$ [b] $-\frac{3}{2}$ [c] $\frac{3}{2}$ [d] $\frac{1}{2}$

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

[a] $\sqrt{\cot x}$ [b] $\cot x$ [c] $\sqrt{\cot x^2}$ [d] $\cot\sqrt{x}$

23) If $y=\left(2x^2+1\right)^6$, then $y'=$

[a] $24\left(2x^2+1\right)^5$ [b] $6x\left(2x^2+1\right)^5$

[c] $6\left(2x^2+1\right)^5$ [d] $24x\left(2x^2+1\right)^5$

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

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

25) $\lim\limits_{x\to 0}\dfrac{x}{\sqrt{9+x}-3}=$

[a] does not exist [b] 0 [c] 6 [d] $\dfrac{1}{6}$

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

[a] $\dfrac{3x-\csc x\cot x}{2\sqrt{3x^2-2\sec x}}$ [b] $\dfrac{6x}{\sqrt{3x^2-2\csc x}}$

[c] $\dfrac{3x-\csc x\cot x}{\sqrt{3x^2-2\sec x}}$ [d] $\dfrac{3x+\csc x\cot x}{\sqrt{3x^2-2\csc x}}$

27) $\lim\limits_{x\to 1^-}\dfrac{3-5x}{x-1}=$

[a] -2 [b] ∞ [c] $-\infty$ [d] 2

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

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

29) Find the domain of the function $f(x)=\sqrt{x-1}$.

[a] $[0,\infty)$ [b] $[1,\infty)$ [c] $\mathbb{R}=(-\infty,\infty)$ [d] $(-\infty,0]$

30) Find the range of the function $f(x)=\sqrt{x-1}$.

[a] $[0,\infty)$ [b] $[1,\infty)$ [c] $\mathbb{R}=(-\infty,\infty)$ [d] $(-\infty,0]$

31) $\cos\left(\tan^{-1}\left(\dfrac{1}{2}\right)\right)=$

[a] $\dfrac{2}{\sqrt{5}}$ [b] $\dfrac{1}{\sqrt{5}}$ [c] $\dfrac{\sqrt{5}}{2}$ [d] $\sqrt{5}$

32) The inverse of the function $f(x)=3x-2$ is

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

[c] $f^{-1}(x)=\dfrac{x-2}{3}$ [d] $f^{-1}(x)=\dfrac{x+2}{3}$

33) If $y = \frac{x}{x-2}$, then $y' =$

[a] $\frac{2x}{x-2}$ [b] $-\frac{2}{x-2}$ [c] $-\frac{2}{(x-2)^2}$ [d] $\frac{2}{(x-2)^2}$

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

[a] $y = 2x - 3$ [b] $y = -2x - 1$ [c] $y = 2x + 1$ [d] $y = -2x + 1$

35) function $f(x) = \sin^{-1}(x+5)$ is continuous on

[a] $[4,6]$ [b] $(-6,-4)$ [c] $(4,6)$ [d] $[-6,-4]$

36) $\frac{2\pi}{3}$ rad =

[a] 120^0 [b] 150^0 [c] 240^0 [d] 300^0

37) The solution of the inequality $|x-4| \le 3$ is

[a] $[1,7]$ [b] $(1,7)$ [c] $(-\infty,1) \cup (7,\infty)$ [d] $(-\infty,1] \cup [7,\infty)$

38) $\lim_{x \to 0} \frac{\sin(4x)}{\tan(3x)} =$

[A] 3 [B] $\frac{3}{4}$ [C] $\frac{4}{3}$ [D] 4

39) The function $f(x) = x^4 - 3x^2 + 1$ is

[A] Even [B] Odd [C] Even and odd [D] Neither even nor odd

40) If $y = \log_9 \sqrt{x^3+9}$, then $y' =$

[a] $\frac{x^2}{2(x^3+9)\ln 9}$ [b] $\frac{3x^2}{2(x^3+9)\ln 9}$ [c] $\frac{3x^2}{(x^3+9)\ln 9}$ [d] $\frac{3x^2}{2(x^3+9)}$

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

[a] $\dfrac{2x}{x-2}$ [b] $-\dfrac{2}{x-2}$ [c] $-\dfrac{2}{(x-2)^2}$ [d] $\dfrac{2}{(x-2)^2}$

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

[a] $y = -2x - 1$ [b] $y = -2x + 1$ [c] $y = 2x + 1$ [d] $y = 2x - 3$

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

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

4) $\sin\left(\tan^{-1}\left(\dfrac{1}{2}\right)\right) =$

[a] $\dfrac{2}{\sqrt{5}}$ [b] $\dfrac{1}{\sqrt{5}}$ [c] $\dfrac{\sqrt{5}}{2}$ [d] $\sqrt{5}$

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

[a] $\sec\sqrt{x}$ [b] $\sqrt{\sec x^2}$ [c] $\sqrt{\sec x}$ [d] $\sec x$

6) Find the domain of the function $f(x) = \sqrt{x-7}$.

[a] $[7,\infty)$ [b] $[0,\infty)$ [c] $\mathbb{R} = (-\infty,\infty)$ [d] $(-\infty,0]$

7) Find the range of the function $f(x) = \sqrt{x-7}$.

[a] $[7,\infty)$ [b] $[0,\infty)$ [c] $\mathbb{R} = (-\infty,\infty)$ [d] $(-\infty,0]$

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

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

9) $\lim\limits_{x\to 0} \dfrac{x}{\sqrt{25+x} - 5} =$

[a] $\dfrac{1}{10}$ [b] 10 [c] 0 [d] does not exist

10) $D^{73}(\sin x) =$

[a] $\sin x$ [b] $\cos x$ [c] $-\sin x$ [d] $-\cos x$

11) Find the domain of the function $f(x)=\dfrac{x+5}{x^2+5x+6}$.

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

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

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

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

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

[a] $(-1,16)$ [b] $(1,16)$ [c] $(-1,10)$ [d] $(1,0)$

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

[a] $(-1,\infty)$ [b] $(1,\infty)$ [c] $(-\infty,-1)$ [d] $(-\infty,1)$

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

[a] $(-1,\infty)$ [b] $(1,\infty)$ [c] $(-\infty,-1)$ [d] $(-\infty,1)$

20) If $y=\log_3\sqrt{x^3+3}$, then $y'=$

[a] $\dfrac{3x^2}{\left(x^3+3\right)\ln 3}$ [b] $\dfrac{x^2}{2\left(x^3+3\right)\ln 3}$

[c] $\dfrac{3x^2}{2\left(x^3+3\right)\ln 3}$ [d] $\dfrac{3x^2}{2\left(x^3+3\right)}$

21) $\lim\limits_{x\to 1^+}\dfrac{5-3x}{x-1}=$

[a] ∞ [b] -2

[c] 2 [d] $-\infty$

22) If $y=\left(2x^2-1\right)^6$, then $y'=$

[a] $24\left(2x^2-1\right)^5$ [b] $24x\left(2x^2-1\right)^5$

[c] $6\left(2x^2-1\right)^5$ [d] $6x\left(2x^2-1\right)^5$

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

[a] $-\frac{1}{2}$ [b] $\frac{3}{2}$ [c] $-\frac{3}{2}$ [d] $\frac{1}{2}$

24) $\frac{5\pi}{3}$ rad $=$

[a] 120^0 [b] 150^0 [c] 240^0 [d] 300^0

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

[a] $3^{-\sec x}\sec x\tan x+2xe^{x^2}$ [b] $-3^{-\sec x}\sec x\tan x+2xe^{x^2}$

[c] $-3^{-\sec x}\sec x\tan x\ln 3+2xe^{x^2}$ [d] $3^{-\sec x}\sec x\tan x\ln 3+2xe^{x^2}$

26) $\lim_{x\to 0}\frac{\tan(3x)}{\tan(4x)}=$

[a] 3 [b] $\frac{3}{4}$ [c] $\frac{4}{3}$ [d] 4

27) If $f(x)=-\tan(x^3)+\cot(x^2)$, then $f'(x)=$

[a] $x[3x\sec^2(x^3)+2\csc^2(x^2)]$ [b] $x[-3x\sec^2(x^3)-2\csc^2(x^2)]$

[c] $x[-3x\sec^2(x^3)+2\csc^2(x^2)]$ [d] $x[3x\sec^2(x^3)-2\csc^2(x^2)]$

28) If $y=(x)^{x^4}$, then $y'=$

[a] $(x)^{x^4+3}[1+\ln x]$ [b] $(x)^{x^4+3}[1+4\ln x]$

[c] $(x)^{x^4+3}[1+4x\ln x]$ [d] $(x)^{x^4}[1+4\ln x]$

29) The solution of the inequality $|x-4|<3$ is

[a] $[1,7]$ [b] $(1,7)$

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

30) If $y=\ln\frac{x-2}{x-3}$, then

[a] $\frac{5}{(x-3)(x-2)}$ [b] $-\frac{5}{(x-3)(x-2)}$

[c] $-\frac{1}{(x-3)(x-2)}$ [d] $\frac{1}{(x-3)(x-2)}$

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

[a] $\frac{6x}{3y^2-2\cos y}$ [b] $\frac{6x}{3y^2+2\cos y}$

[c] $-\frac{6x}{3y^2-2\cos y}$ [d] $-\frac{6x}{3y^2+2\cos y}$

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

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

[c] $f^{-1}(x)=\dfrac{x-2}{3}$ [d] $f^{-1}(x)=\dfrac{x+2}{3}$

33) The equation of the line passes through the points $(5,-2)$ and $(3,4)$ is

[a] $y=-3x+17$ [b] $y=3x+4$ [c] $y=-3x+13$ [d] $y=3x-13$

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

[a] $\cos^2(2x)\left[\cos(2x)-6x\sin(2x)\right]$ [b] $\cos^2(2x)\left[\cos(2x)-3x\sin(2x)\right]$

[c] $\cos^2(2x)\left[\cos(2x)-6\sin(2x)\right]$ [d] $\cos^2(2x)\left[\cos(2x)+6x\sin(2x)\right]$

35) The function $f(x)=5x^3+7$ is

[a] Even [b] Odd [c] Even and odd [d] Neither even nor odd

36) function $f(x)=\cos^{-1}(x-2)$ is continuous on

[a] $(-3,-1)$ [b] $[1,3]$ [c] $[-2,-1]$ [d] $(1,3)$

37) If $y=\cot^{-1}(x)+\sin^{-1}(e^x)$, then $y'=$

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

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

38) The absolute maximum point of $f(x)=3x^2-12x+1$ in $[0,3]$ is

[a] $(0,2)$ [b] $(0,1)$ [c] $(2,-13)$ [d] $(2,-11)$

39) The absolute minimum point of $f(x)=3x^2-12x+1$ in $[0,3]$ is

[a] $(0,2)$ [b] $(0,1)$ [c] $(2,-13)$ [d] $(2,-11)$

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

[a] $\dfrac{3x-\csc x\ \cot x}{2\sqrt{3x^2+2\csc x}}$ [b] $\dfrac{6x}{\sqrt{3x^2+2\csc x}}$

[c] $\dfrac{3x-\csc x\ \cot x}{\sqrt{3x^2+2\csc x}}$ [d] $\dfrac{3x+\csc x\cot x}{\sqrt{3x^2+2\csc x}}$

Higher Education Ministry King Abdul-Aziz University Faculty of Science Department of Mathematics		Final Exam Spring, 2013 Math 110 - 40 Marks Time Allowed: 120 Minutes
Name	ID	C

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

[a] $3^{-\csc x}\csc x \cot x + 2xe^{x^2}$ [b] $-3^{-\csc x}\csc x \cot x + 2xe^{x^2}$

[c] $3^{-\csc x}\csc x \cot x \ln 3 + 2xe^{x^2}$ [d] $-3^{-\csc x}\csc x \cot x \ln 3 + 2xe^{x^2}$

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

[a] $-\frac{1}{1+x^2} - \frac{e^x}{\sqrt{1-e^{2x}}}$ [b] $\frac{1}{1+x^2} + \frac{e^x}{\sqrt{1-e^{2x}}}$

[c] $\frac{1}{1+x^2} - \frac{e^x}{\sqrt{1-e^{2x}}}$ [d] $-\frac{1}{1+x^2} + \frac{e^x}{\sqrt{1-e^{2x}}}$

3) $\lim_{x\to 1} \frac{x^2+x-2}{3x^2-2x-1} =$

[a] $\frac{4}{3}$ [b] $\frac{3}{4}$ [c] 1 [d] does not exist

4) If $y = (2x^2+1)^5$, then $y' =$

[a] $20x(2x^2+1)^4$ [b] $5x(2x^2+1)^4$

[c] $5(2x^2+1)^4$ [d] $20(2x^2+1)^4$

5) The inverse of the function $f(x) = 2x - 3$ is

[a] $f^{-1}(x) = \frac{x-3}{2}$ [b] $f^{-1}(x) = \frac{x+3}{2}$

[c] $f^{-1}(x) = \frac{1}{x-3}$ [d] $f^{-1}(x) = \frac{1}{x+3}$

6) The solution of the inequality $|x-4| > 3$ is

[a] $[1,7]$ [b] $(1,7)$

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

7) $\lim_{x\to 0} \frac{\sqrt{25+x}-5}{x} =$

[a] $\frac{1}{10}$ [b] 10 [c] 0 [d] does not exist

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

[a] ± 1 [b] ± 3 [c] $-3, 1$ [d] $-1, 3$

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

[a] $(-3,1)$ [b] $(-1,3)$ [c] $(-\infty,-1)\cup(3,\infty)$ [d] $(-\infty,-3)\cup(1,\infty)$

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

[a] $(-3,1)$ [b] $(-1,3)$ [c] $(-\infty,-1)\cup(3,\infty)$ [d] $(-\infty,-3)\cup(1,\infty)$

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

[a] $(3,32)$ [b] $(-1,-9)$ [c] $(-1,10)$ [d] $(3,-22)$

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

[a] $(3,32)$ [b] $(-1,-9)$ [c] $(-1,10)$ [d] $(3,-22)$

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

[a] $(1,\infty)$ [b] $(-1,\infty)$ [c] $(-\infty,1)$ [d] $(-\infty,-1)$

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

[a] $(1,\infty)$ [b] $(-1,\infty)$ [c] $(-\infty,1)$ [d] $(-\infty,-1)$

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

[a] $(-1,-9)$ [b] $(1,-10)$ [c] $(-1,10)$ [d] $(1,-6)$

16) $\lim\limits_{x\to 0}\dfrac{\tan(3x)}{\sin(5x)}=$

[a] $\dfrac{3}{5}$ [b] 3 [c] 5 [d] $\dfrac{5}{3}$

17) $\dfrac{5\pi}{6}$ rad $=$

[a] 120^0 [b] 150^0 [c] 240^0 [d] 300^0

18) $\lim\limits_{x\to 1^-}\dfrac{5-3x}{x-1}=$

[a] ∞ [b] -2 [c] 2 [d] $-\infty$

19) The equation of the line passes through the points $(3,4)$ and $(5,-2)$ is

[a] $y=-3x+13$ [b] $y=3x-13$ [c] $y=3x+4$ [d] $y=-3x+17$

20) The function $f(x)=\sin^{-1}(x+2)$ is continuous on

[a] $[-3,-1]$ [b] $[1,3]$ [c] $(-3,-1)$ [d] $(1,3)$

21) $\sec\left(\tan^{-1}\left(\dfrac{1}{2}\right)\right)=$

[a] $\dfrac{2}{\sqrt{5}}$ [b] $\dfrac{1}{\sqrt{5}}$ [c] $\dfrac{\sqrt{5}}{2}$ [d] $\sqrt{5}$

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

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

23) $D^{74}(\sin x)=$

[a] $\sin x$ [b] $\cos x$ [c] $-\sin x$ [d] $-\cos x$

24) The function $f(x)=x^3+3x^2-1$ is

[a] Even [b] Odd [c] Even and odd [d] Neither even nor odd

25) If $y=\dfrac{x}{x-2}$, then $y'=$

[a] $\dfrac{2x}{x-2}$ [b] $-\dfrac{2}{x-2}$ [c] $-\dfrac{2}{(x-2)^2}$ [d] $\dfrac{2}{(x-2)^2}$

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

[a] $y=-2x+1$ [b] $y=-2x-1$ [c] $y=2x+1$ [d] $y=2x-3$

27) Find the domain of the function $f(x)=\sqrt{x-9}$.

[a] $\mathbb{R}=(-\infty,\infty)$ [b] $[9,\infty)$ [c] $[0,\infty)$ [d] $(-\infty,0]$

28) Find the range of the function $f(x)=\sqrt{x-9}$.

[a] $\mathbb{R}=(-\infty,\infty)$ [b] $[9,\infty)$ [c] $[0,\infty)$ [d] $(-\infty,0]$

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

[a] $\csc\sqrt{x}$ [b] $\sqrt{\csc x^2}$ [c] $\sqrt{\csc x}$ [d] $\csc x$

30) If $f(x)=-\tan(x^3)-\cot(x^2)$, then $f'(x)=$

[a] $x[3x\sec^2(x^3)+2\csc^2(x^2)]$ [b] $x[-3x\sec^2(x^3)-2\csc^2(x^2)]$

[c] $x[-3x\sec^2(x^3)+2\csc^2(x^2)]$ [d] $x[3x\sec^2(x^3)-2\csc^2(x^2)]$

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

[a] $\dfrac{6x}{3y^2-2\cos y}$ [b] $\dfrac{6x}{3y^2+2\cos y}$

[c] $-\dfrac{6x}{3y^2-2\cos y}$ [d] $-\dfrac{6x}{3y^2+2\cos y}$

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

[a] $-\dfrac{1}{\sqrt{x}}-\dfrac{1}{x^2}$ [b] $\dfrac{1}{\sqrt{x}}-\dfrac{1}{x^4}$

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

33) If $y = \log_2 \sqrt{x^3+2}$, then $y' =$

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

34) The absolute minimum point of $f(x) = 3x^2 - 12x + 1$ in $[0,3]$ is

[a] $(0,1)$ [b] $(0,2)$ [c] $(2,-11)$ [d] $(2,-13)$

35) The absolute maximum point of $f(x) = 3x^2 - 12x + 1$ in $[0,3]$ is

[a] $(0,1)$ [b] $(0,2)$ [c] $(2,-11)$ [d] $(2,-13)$

36) If $y = \ln\dfrac{x+2}{x+3}$, then

[a] $\dfrac{5}{(x+3)(x+2)}$ [b] $-\dfrac{5}{(x+3)(x+2)}$ [c] $-\dfrac{1}{(x+3)(x+2)}$ [d] $\dfrac{1}{(x+3)(x+2)}$

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

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

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

[a] $\cos^2(2x)\left[\cos(2x) - 6\sin(2x)\right]$ [b] $\cos^2(2x)\left[\cos(2x) - 3x\sin(2x)\right]$

[c] $\cos^2(2x)\left[\cos(2x) - 6x\sin(2x)\right]$ [d] $\cos^2(2x)\left[\cos(2x) + 6x\sin(2x)\right]$

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

[a] $\dfrac{3x + \sec x\tan x}{\sqrt{3x^2 + 2\sec x}}$ [b] $\dfrac{3x - \sec x\tan x}{\sqrt{3x^2 + 2\sec x}}$

[c] $\dfrac{3x - \sec x\tan x}{2\sqrt{3x^2 + 2\sec x}}$ [d] $\dfrac{6x}{\sqrt{3x^2 + 2\sec x}}$

40) If $y = (x)^{x^5}$, then $y' =$

[a] $(x)^{x^5+4}\left[1 + \ln x\right]$ [b] $(x)^{x^5}\left[1 + 5\ln x\right]$

[c] $(x)^{x^5+4}\left[1 + 5x\ln x\right]$ [d] $(x)^{x^5+4}\left[1 + 5\ln x\right]$

Math 110

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