B

King Abdul Aziz University Faculty of Sciences Mathematics Department
Math 110 Spring 2011 Final (40 Marks) Time 120 m

Student Name: Student Number: B

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) $D^{121}(\sin x)=$

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

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

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

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

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

13) If $f(x)=5x^2$, then $f'(x)=$

[a] $\lim_{x\to 0}\frac{5(x+h)^2+(5x^2)}{h}$ [b] $\lim_{h\to 0}\frac{5(x+h)^2-(5x^2)}{h}$

[c] $\lim_{h\to 0}\frac{5(x+h)^2+(5x^2)}{h}$ [d] $\lim_{x\to 0}\frac{5(x+h)^2-(5x^2)}{h}$

14) 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] $-\frac{1}{1+x^2}+\frac{e^x}{\sqrt{1-e^{2x}}}$

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

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

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

16) If $y=x^{\cot x}$, then $y'=$

[a] $x^{\cot x}\left[\frac{\cot x}{x}-\sec^2 x\ln x\right]$ [b] $x^{\cot x}\left[\frac{\cot x}{x}-\csc^2 x\ln x\right]$

[c] $x^{\cot x}\left[\frac{\cot x}{x}+\sec^2 x\ln x\right]$ [d] $x^{\cot x}\left[\frac{\cot x}{x}+\csc^2 x\ln x\right]$

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 $f(x)=x+2$, and $g(x)=x+3$, then $(fg)(x)=$

[a] x^2+5x+6 [b] x^2+7x+6 [c] x^2-5x+6 [d] x^2-7x+6

25) 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] $-\dfrac{6x}{3y^2+2\cos y}$

26) The horizontal asymptote of $f(x)=\dfrac{x+1}{7x+1}$ is

[a] $x=-\dfrac{1}{7}$ [b] $y=\dfrac{1}{7}$ [c] $x=\dfrac{1}{7}$ [d] $y=-\dfrac{1}{7}$

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

[a] $\dfrac{3x^2}{2\sqrt{2x^3+2x}}$ [b] $\dfrac{3x^2+1}{2\sqrt{2x^3+2x}}$ [c] $\dfrac{3x^2+1}{\sqrt{2x^3+2x}}$ [d] $\dfrac{6x^2}{\sqrt{2x^3+2x}}$

28) The vertical asymptote of $f(x)=\dfrac{x+1}{7x+1}$ is

[a] $x=-\dfrac{1}{7}$ [b] $y=\dfrac{1}{7}$ [c] $x=\dfrac{1}{7}$ [d] $y=-\dfrac{1}{7}$

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

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

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

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

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) $\lim_{x\to 1}\dfrac{5x-5}{\ln x}=$

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

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

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

35) $\dfrac{2\pi}{3}$ rad $=$

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

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

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

37) $\lim_{x\to 0}\dfrac{\sin(4x)}{\tan(3x)}=$

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

38) The function $f(x)=\dfrac{x^2+1}{x^2-3}$ is

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

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

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

40) $\lim_{x\to\infty}\dfrac{2^x}{7^x}=$ $\left(\lim_{x\to\infty}a^x=\infty, a>1, \lim_{x\to\infty}a^x=0, 0<a<1\right)$

[a] 0 [b] 1 [c] does not exist [d] ∞