C

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

Student Name: Student Number: C

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

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

2) 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] $-3^{\csc x}\csc x\cot x\ln 3+2xe^{x^2}$

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

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

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

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

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

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

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

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) $\lim_{x\to 0}\dfrac{\tan(3x)}{\sin(5x)}=$

[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) The vertical asymptote of $f(x)=\dfrac{x+1}{4x-1}$ is

[a] $y=-\dfrac{1}{4}$ [b] $x=-\dfrac{1}{4}$ [c] $y=\dfrac{1}{4}$ [d] $x=\dfrac{1}{4}$

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

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

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

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

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) $D^{123}(\sin x) =$

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

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

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

25) $\lim\limits_{x\to 1} \dfrac{\ln x}{5-5x} =$

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

26) The horizontal asymptote of $f(x) = \dfrac{x+1}{4x-1}$ is

[a] $y = -\dfrac{1}{4}$ [b] $x = -\dfrac{1}{4}$ [c] $y = \dfrac{1}{4}$ [d] $x = \dfrac{1}{4}$

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

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

28) 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] $\csc x$

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

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

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

30) If $f(x) = x+1$, and $g(x) = x+6$, then $(fg)(x) =$

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

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) $\lim_{x\to\infty}\frac{2^x}{5^x}=$ $\left(\lim_{x\to\infty}a^x=\infty, a>1, \lim_{x\to\infty}a^x=0, 0<a<1\right)$

[a] 1 [b] does not exist [c] 0 [d] ∞

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

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

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

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

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

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

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

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

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