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Final Exam – Math110
Date: 18/8/1438
Time: 120 minutes

Name……………………………………ID:…………..........................  **A**

**Choose the correct answer of the following questions:**

| (1) | If $y = e^2$ then $y' =$ | | | |
|---|---|---|---|---|
| | (a) $e$ | (b) $2e$ | (c) 1 | (d) 0 |

| (2) | If $f(x) = 2x^3 + 4x + e^x$ then $f''(x) =$ | | | |
|---|---|---|---|---|
| | (a) $6x + e^x$ | (b) $12x - e^x$ | (c) $12x + e^x$ | (d) 0 |

| (3) | If $y = \dfrac{\sec x}{1+\sec x}$ then $\dfrac{dy}{dx} =$ | | | |
|---|---|---|---|---|
| | (a) $\dfrac{\sec x}{(1+\sec x)^2}$ | (b) $\dfrac{\sec x \tan x}{1+\sec x}$ | (c) $\dfrac{1}{(1+\sec x)^2}$ | (d) $\dfrac{\sec x \tan x}{(1+\sec x)^2}$ |

| (4) | $\lim\limits_{\theta \to 0} \dfrac{\cos\theta - 1}{\theta} = 0$ | |
|---|---|---|
| | (a) True | (b) False |

| (5) | If $y = (x^3+3)(x^2-1)$ then $y' =$ | | | |
|---|---|---|---|---|
| | (a) $5x^4 - 3x^2 + 6x$ | (b) $5x^4 - x^2 + 6x$ | (c) $5x^4 - 3x^2$ | (d) $4x^3 - 3x^2 + 6x$ |

| (6) | The derivative $f'(x)$ for the function $f(x) = \tan x + \csc x$ is | | | |
|---|---|---|---|---|
| | (a) $\sec^2 x + \csc x$ | (b) $\sec x - \csc x \cot x$ | (c) $\sec^2 x - \csc x \cot x$ | (d) $\sec^2 x + \csc x \cot x$ |

| (7) | If $y = e^x \tan x$ , then $y' =$ | | | |
|---|---|---|---|---|
| | (a) $e^x(\sec^2 x + \tan x)$ | (b) $e^x(\sec^2 x - \tan x)$ | (c) $e^x(\sec x + \tan x)$ | (d) $e^x \sec^2 x + \tan x$ |

| (8) | If $f(x) = \sin(\cos x)$, then $f'(x) =$ | | | |
|---|---|---|---|---|
| | (a) $\cos x \cos(\cos x)$ | (b) $-\cos x \sin(\cos x)$ | (c) $\sin x \cos(\cos x)$ | (d) $-\sin x \cos(\cos x)$ |

| (9) | If $y = \tan^{-1} x^2$, then $\dfrac{dy}{dx} =$ | | | |
|---|---|---|---|---|
| | (a) $\dfrac{1}{1+x^2}$ | (b) $\dfrac{1}{1-x^2}$ | (c) $\dfrac{2x}{1+x^2}$ | (d) $\dfrac{2x}{1+x^4}$ |

| | | | | |
|---|---|---|---|---|
| (10) | If $x^2+2y^2=5$, then $y'=$ | | | |
| | (a) $-\frac{x}{y}$ | (b) $\frac{2y}{x}$ | (c) $-\frac{x}{2y}$ | (d) $\frac{x}{y}$ |

| | | | | |
|---|---|---|---|---|
| (11) | If $y=x^x$ then $y'=$ | | | |
| | (a) $x^x \ln x$ | (b) $x^x$ | (c) $x^x(1-\ln x)$ | (d) $x^x(1+\ln x)$ |

| | | | | |
|---|---|---|---|---|
| (12) | If $y=\ln(\sin x^3)$, then $y'=$ | | | |
| | (a) $-3x^2\cos^3 x$ | (b) $3x^2\cot x^3$ | (c) $3x^2\sin x^3$ | (d) $3x^2\cot^3 x$ |

| | | |
|---|---|---|
| (13) | If $f(x)=(7)^{\sin 3x}$ then $f'(x)=$ | |
| | (a) $(7)^{\sin 3x}\ln 7$ | (c) $-3(7)^{\sin 3x}\cos(3x)\ln 7$ |
| | (b) $(7)^{\sin 3x}\cos(3x)\ln 7$ | (d) $3(7)^{\sin 3x}\cos(3x)\ln 7$ |

| | | | | |
|---|---|---|---|---|
| (14) | $\lim\limits_{x\to 1}\sin^{-1}\left(\frac{x-1}{x^2-1}\right)=$ | | | |
| | (a) $\frac{\pi}{2}$ | (b) $\frac{\pi}{6}$ | (c) $\frac{\pi}{3}$ | (d) Does not exist |

| | | | | |
|---|---|---|---|---|
| (15) | $\lim\limits_{\theta\to 0}\frac{\sin(5\theta)}{9\theta}=$ | | | |
| | (a) 9 | (b) 5 | (c) $\frac{5}{9}$ | (d) $\frac{9}{5}$ |

| | | | | |
|---|---|---|---|---|
| (16) | If $y=e^{\cot 2x}$ then $y'=$ | | | |
| | (a) $-\csc^2 x\, e^{\cot 2x}$ | (b) $-2\csc^2 x\, e^{\cot 2x}$ | (c) $-2\csc x\, e^{\cot 2x}$ | (d) $-\csc x\, e^{\cot 2x}$ |

| | | | | |
|---|---|---|---|---|
| (17) | The solution of the equation $\ln(x+4)=2$ is | | | |
| | (a) $e^2-4$ | (b) $e-2$ | (c) $e-14$ | (d) $e^2+4$ |

| | | | | |
|---|---|---|---|---|
| (18) | $\log_2 16-\log_2 8+\log_2 4=$ | | | |
| | (a) 2 | (b) 3 | (c) 1 | (d) 4 |

| | | | | |
|---|---|---|---|---|
| (19) | The inverse of the function of $f(x)=3+\frac{1}{2}x^2$ is | | | |
| | (a) $f^{-1}(x)=\sqrt{2x-6}$ | (b) $f^{-1}(x)=\sqrt{2x+6}$ | (c) $f^{-1}(x)=\sqrt{6x-2}$ | (d) $f^{-1}(x)=\sqrt{2x+3}$ |

| | | |
|---|---|---|
| (20) | The function $h(x)=x^3+9$ is one – to –one | |
| | (a) True | (b) False |

| (21) | $\lim_{x \to 2} \frac{x^2 + x - 6}{x - 2} =$ | | | |
|---|---|---|---|---|
| | (a) -5 | (b) 5 | (c) 8 | (d) 1 |

| (22) | $\lim_{x \to 0} \frac{\sqrt{x + 9} - 3}{x} =$ | | | |
|---|---|---|---|---|
| | (a) $\frac{1}{6}$ | (b) -6 | (c) - $\frac{1}{6}$ | (d) 6 |

| (23) | $\lim_{x \to \infty} \frac{\sqrt{4x^2 + 1}}{x - 1} =$ | | | |
|---|---|---|---|---|
| | (a) 5 | ( b) 4 | (c) 2 | (d) 1 |

| (24) | The vertical asymptotes of the graph of the function $y = \frac{3x + 1}{2 - 3x}$ is | | | |
|---|---|---|---|---|
| | (a) $x = -1$ | (b) $y = -1$ | (c) $x = \frac{2}{3}$ | (d) $y = \frac{2}{3}$ |

| (25) | The horizontal asymptotes of the graph of the function $y = \frac{3x + 1}{2 - 3x}$ is | | | |
|---|---|---|---|---|
| | (a) $x = -1$ | (b) $y = -1$ | (c) $x = \frac{2}{3}$ | (d) $y = \frac{2}{3}$ |

| (26) | Any polynomial function is continuous on $\mathbb{R} = (-\infty, \infty)$. | |
|---|---|---|
| | (a) True | (b) False |

| (27) | The function $f(x) = \frac{\ln x}{x^2 - 4}$ is continuous on | | | |
|---|---|---|---|---|
| | (a) $(0,2) \cup (2,\infty)$ | (b) $R - \{-2,2\}$ | (c) $(0,2] \cup [2,\infty)$ | (d) $(0,\infty)$ |

| (28) | The solution of the equation $e^{x-5} = 3$ is | | | |
|---|---|---|---|---|
| | (a) $x = \ln 5 + 3$ | (b) $x = \ln 5 - 3$ | (c) $x = \ln 3 - 5$ | (d) $x = \ln 3 + 5$ |

| (29) | The solution set of the inequality $2x + 1 < 5x - 8$ is | | | |
|---|---|---|---|---|
| | (a) $(-\infty, 3)$ | (b) $[3, \infty)$ | (c) $(3, \infty)$ | (d) $(-\infty, 3]$ |

| (30) | The solution set of the inequality $1 < 3x + 4 \le 16$ is | | | |
|---|---|---|---|---|
| | (a) $(-1, 3]$ | (b) $[-1, 3)$ | (c) $[-1, 4]$ | (d) $(-1, 4]$ |

| (31) | The equation of the line passes through the point $(2,-3)$ with slope $6$ is | | | |
|---|---|---|---|---|
| | (a) $y-6x=-15$ | (b) $y+6x=-15$ | (c) $y+6x=15$ | (d) $y-6x=15$ |

| (32) | The equation of the line passing through (1,-6) and parallel to the line $x+2y=6$ is | | | |
|---|---|---|---|---|
| | (a) $x+2y=-11$ | (b) $x+2y=11$ | (c) $x-3y=-11$ | (d) $x+3y=11$ |

| (33) | The equation for the line passes through $(-1,0)$ and perpendicular to the line $2x+3y-1=0$ is | | | |
|---|---|---|---|---|
| | (a) $3y-2x=-3$ | (b) $3y+2x=-3$ | (c) $2y-3x=3$ | (d) $2y+3x=3$ |

| (34) | $\cot\theta.\sec\theta=$ | | | |
|---|---|---|---|---|
| | (a) $\cos\theta$ | (b) $\tan\theta$ | (c) $\sec\theta$ | (d) $\csc\theta$ |

| (35) | If $\tan\theta=2,\ 0\le\theta\le\frac{\pi}{2}$ then $\cos\theta=$ | | | |
|---|---|---|---|---|
| | (a) $\frac{2}{\sqrt{5}}$ | (b) $\frac{1}{\sqrt{5}}$ | (c) $\frac{1}{3}$ | (d) $\frac{2}{3}$ |

| (36) | The domain of the function $f(x)=\frac{5x+4}{x^2+3x+2}$ is | | | |
|---|---|---|---|---|
| | (a) $\mathbb{R}$ | (b) $\mathbb{R}-\{4,5\}$ | (c) $\mathbb{R}-\{1,2\}$ | (d) $\mathbb{R}-\{-1,-2\}$ |

| (37) | The function $f(x)=\frac{1-x^2}{1+\sqrt{x}}$ is classified as | | | |
|---|---|---|---|---|
| | (a) Polynomial | (b) Exponential | (c) Algebraic | (d) Rational |

| (38) | The function $f(x)=3x^3-x^5$ is | | | |
|---|---|---|---|---|
| | (a) Even | (b) Odd | (c) Neither even nor odd | (d) Even and odd |

| (39) | The graph of $y=\cos x$ is shifted up $6$ units and right $2$ units, the equation for the graph is | | | |
|---|---|---|---|---|
| | (a) $y=\cos(x-2)+6$ | (b) $y=\cos(x+2)+6$ | (c) $y=\cos(x-2)-6$ | (d) $y=\cos(x+2)-6$ |

| (40) | If $f(x)=x+1$, $g(x)=2x$ and $h(x)=x-1$, then $(f\circ g\circ h)(x)=$ | | | |
|---|---|---|---|---|
| | (a) $2x-1$ | (b) $2x-2$ | (c) $2x$ | (d) $2x+1$ |