

• Time Allowed : 75 Minutes

• No Calculators

• Show your work

NAME SEC. NO.

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1.(a) Solve the equation: $\log_2 (2 - x) + \log_2 (-x) = 3 + \log_2 (x + 3)$ (10 pts)

(b) Let $f(x) = \ln x^2$, $g(x) = e^{2x}$. Find the domain of $f(x)$, the range of $g(x)$, and then simplify $f(g(x))$, $g(f(x))$. (no need for graph) (8 pts)

(c) Graph $y = \left| \log_{\frac{1}{2}}(x + 4) \right|$ showing all intercepts. Write the domain and asymptote(s). (12 pts)

2.(a) Simplify: $(\cos x)(\sec x) - \csc^2 x + \frac{\cos x}{\sin x \tan x}$

(8 pts)

(b) Find the value of: $\cot 330^\circ + 4 \cos 240^\circ + \tan(-135^\circ) - \sec 20^\circ + \sec 700^\circ$

(8 pts)

(c) Graph $y = \tan\left(\frac{x}{2} - \frac{\pi}{4}\right)$, $-\frac{3\pi}{2} \leq x \leq \frac{9\pi}{2}$. Write down all vertical asymptotes and zeros (x-intercepts) over the interval $[-\frac{3\pi}{2}, \frac{9\pi}{2}]$.

(14 pts)

3. Complete the following (show your work and simplify your answer):

(40 pts)

• If $\cot \theta = \frac{2}{3}$, $\cos \theta < 0$, then $\sin \theta = \dots\dots\dots$

• For $y = \csc(3\pi x + \frac{\pi}{6}) + 1$, the period = $\dots\dots\dots$ and the phase shift = $\dots\dots\dots$

• $e^{2\ln 3} + \ln(\ln e) + \log(\log 10^{10}) = \dots\dots\dots$

• If $f(x) = \log(x - 3)$, then $f^{-1}(3) = \dots\dots\dots$

• The range of $y = 2 \sec 5x - 4$ is $\dots\dots\dots$

• If $\log 2 = a$ and $\log 3 = b$, then $\log_9 24 = \dots\dots\dots$

• The function $y = \sec 2x + x^3 \tan x$ is (odd , even , or neither odd nor even). (circle one)

• The x -intercept of the graph of $y = 2^x - 3$ is $\dots\dots\dots$

• The length of an arc that subtends a central angle 70° in a circle of radius 2 cm is $\dots\dots\dots$

• If $0 < a < 1$, and $\sin 40^\circ = a$, then all values of θ for which $\sin \theta = -a$, $0^\circ \leq \theta \leq 360^\circ$ are $\dots\dots\dots$