MAC 2313 Calculus III, Worksheet 4B - Calc I Review

Directions:

- Provide the answer in the method and the format the question requires.
- You may not work out more than one problem per page (one sheet has two pages).
- Write down the answers legibly. Unrecognizable steps/works will not be considered for grading.
- Simplify to the best possible. Showing the work is necessary and important. No work means no points.

Q1) Qn 1: If $f(x) = \sec(\frac{\pi(\sqrt{(x^2+1)}}{2})$ then $f(0) =$ _____.

Qn 2: If $f(x) = \sin(x+1)$, $g(x) = e^{(x-1)^2-1}$, and $h(x) = 1 + \ln x$, then $(h \circ g \circ f)(x) =$ _____.

Qn 3: $\lim_{x\to 0} \dfrac{1}{x} =$ _____.

Qn 4: True or False: The function $f(x) = x^4 - x^2 + 1$ has a zero by the Intermediate Value Theorem. $\boxed{T \ / \ F}$

Q2) (a) Let $f(x) = \sqrt{5 - \sin x}$ and $g(x) = \sqrt{x^2 - 9}$, find $f \circ g$ and the domain of $\frac{f}{g}$.

(b) Derive the value of $\log_2 80 - \log_2 5$.

Q3) (a) Derive the inverse of the function $f(x) = e^{2x-3}$.

(b) Derive the value of $\lim_{x\to 9} \frac{\sqrt{x}-3}{x-9}$.

Q4) Derive the limit of $\lim_{t\to 0}(\frac{1}{t^2(\sqrt{1+t^2})} - \frac{1}{t^2})$.

Q5) Derive the derivative of $f(x) = \sqrt[3]{x}$ (Do not use the power rule, finding the derivative using the power rule will have 0 points).

Q6) Derive the derivative of $f(x) = \dfrac{(e^x \sin(2x) + \ln x)}{e^{-2x}}$

Q7) Find the equation of the tangent line of the function $f(x) = \Big(\ln(\sqrt{x+1} + e^x)\Big)^2$ at $x = 0$.

Q8) Find the Absolute maximum of the function $x^{\frac{3}{5}}(4 - x^2)$ from $[0, 3]$.

Q9) Let $f(x) = 3x^4 - 4x^3 - 12x^2$. Find

A. Critical Value(s)

B. Intervals in which f is increasing and/or decreasing

C. Local Extrema

D. Concavity

E. Point(s) of Inflection, if any.

Q10) Find f if $f''(x) = \cos(\frac{\pi}{2}x) + \frac{1}{x^2} + e^x + x$, $f(1) = 1$ and $f'(1) = 2$.

Q11) Find the value of $\int_0^1 \Big[(\frac{2t^2 + t^2\sqrt{t}}{t^{(3/2)}}) + \sin(t)\Big] dt$.

Q12) Find $\int (\sqrt{1 - x^2})x^5 dx$.