

Question 1:

(a)[3] Determine $\sin^{-1}(-\sqrt{3}/2)$.

(b)[3] Determine $\lim_{x \rightarrow -\infty} \arctan(x^3)$.

(c)[4] Let $f(x) = x \arccos(x) - \sqrt{1-x^2}$. Determine $f'(1/2)$.

Question 2:

(a)[3] Evaluate the limit if it exists: $\lim_{x \rightarrow 0} \frac{\sinh(5x)}{\tanh(3x)}$.

(b)[3] Determine $f'(0)$ if $f(x) = \ln(\cosh(2x)) - \operatorname{sech}(\ln(1+x))$.

(c)[4] Does the equation $\sinh(x) = 1 - \cosh(x)$ have solutions? If so, find them. If not, explain why.

Question 3:

(a)[5] Evaluate the limit if it exists: $\lim_{x \rightarrow 0} \frac{x^2}{1 + x/2 - \sqrt{1 + x}}$

(b)[5] Evaluate the limit if it exists: $\lim_{x \rightarrow 0^+} x(\ln(x))^2$

Question 4:

(a)[5] Evaluate the limit if it exists: $\lim_{x \rightarrow 0} \frac{x - \sin(x)}{\sin(x^2)}$

(b)[5] Evaluate the limit if it exists: $\lim_{x \rightarrow \infty} x^{(e^{-x})}$

Question 5: Use the definition of the definite integral in the form

$$\int_a^b f(x) dx = \lim_{n \rightarrow \infty} \sum_{i=1}^n f(x_i) \Delta x$$

to evaluate

$$\int_{-2}^1 2x^2 dx$$

Carefully set up the Riemann sum and clearly show the steps of your simplification.