1.  

\[ W = \lim_{x \to 2} \left( \frac{4}{x - 2} - \frac{16}{x^2 - 4} \right) \]

\[ M = \lim_{x \to 0} \frac{\arctan(2x)}{\arcsin x} \]

Find the value of \( W + M \).

2.  

Let

\[ f(x) = \sin^3 x + \cos^3 x \]

List all critical numbers on the interval \([0, 2\pi]\).

For data entry sake, enter the total number of critical numbers on the interval \([0, 2\pi]\).
3.

Let

\[ f(x) = \sqrt{x - x^2} \]

Find \( f''\left(\frac{1}{2}\right) \).

4.

Find the slope of the tangent line at \( x = 0 \) for the function

\[ e^y + xy = e \]

a) \( e \) \( e \) \( -e \)
b) \( 1 \) \( f \) \( e^2 \)
c) \( 0 \) \( g \) \( 2 \)
d) \( \frac{-1}{e} \) \( h \) \( \frac{2}{e} \)
5. Your job is to build a pipeline from an at sea oil well to a refinery on the shore. The oil well is 1 mile offshore and the refinery is 4 miles away along the coastline. Building a pipe costs $500,000 per mile underwater and $300,000 per mile under land. Find the value of $x$ so that cost is minimized. For data entry sake, enter in the value of $4x$.

6. Let $f(x) = ax^2 + bx$

Using Riemann sums with three equal sized intervals to estimate $\int_{0}^{3} f(x) \, dx$, the left endpoints estimate is 5 and the right endpoints estimate is 2. Find the value of $a$ and $b$. 
7. Let \( g(x) = \int_{-1}^{x} \arcsin(t^2) \, dt \).

Find \( g(-1) + \frac{6}{\pi} \cdot g'(\frac{4\sqrt{3}}{4}) + \sqrt{15} \cdot g''(\frac{1}{2}) \).

8. \( A = \int_{0}^{\frac{1}{3}} \sqrt[3]{1-3x} \, dx \)

\( B = \int_{0}^{\frac{3}{\sqrt{e-1}}} \frac{x^2}{x^3+1} \, dx \)

Enter the value of \( 8A + 6B \).