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) $-e$

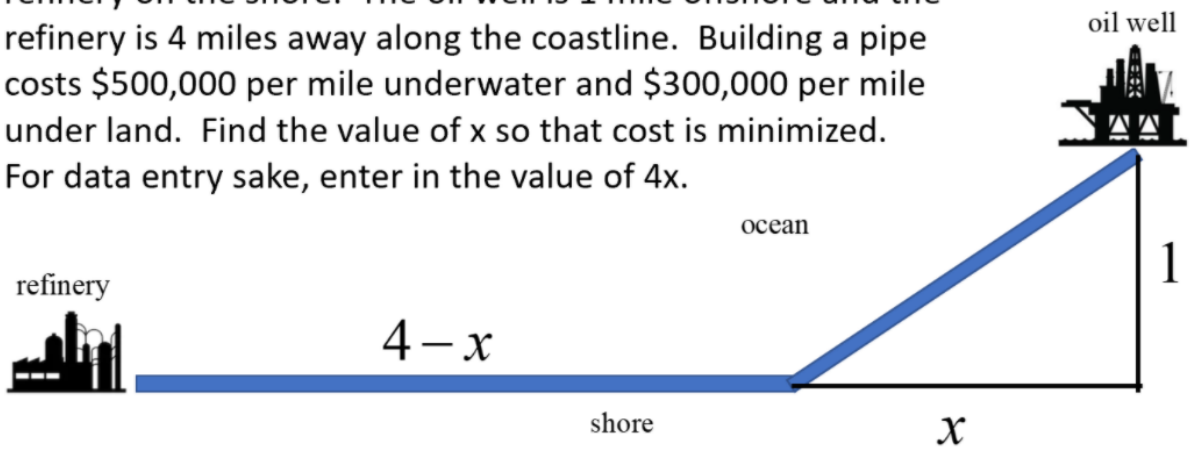
b) 1 f) e^2

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.

$$\text{Let } g(x) = \int_{-1}^{x} \arcsin\left(t^2\right) dt.$$

$$\text{Find } g(-1) + \tfrac{6}{\pi} \cdot g'\left(\sqrt[4]{\tfrac{3}{4}}\right) + \sqrt{15} \cdot g''\left(\tfrac{1}{2}\right)$$

8.

$$A = \int_{0}^{1/3} \sqrt[3]{1-3x}\ dx$$

$$B = \int_{0}^{\sqrt[3]{e-1}} \frac{x^2}{x^3+1}\ dx$$

Enter the value of $8A + 6B$.