Name: ______________________________ Date: ______________

ACTIVITY 2: A Costly Exploration…or not!

An analyst determined that a company's cost function for producing one of its products is given by $C(x) = 0.000003x^3 - 0.04x^2 + 200x + 70{,}000$.

1. Find C(4000) and C(4001) to determine Cost of the 4001st item.

   C(4001)– C(4000) = 422023 – 222000 =23

2. Use similar processes to find the cost of the 8001st item produced.

   C(8001)– C(8000) = 646136 – 646000 = 136

3. Describe how the company would determine the amount of production that results in the lowest marginal costs. Why might it be inefficient to do it this way?

   The company would have to find the marginal cost of at every level of production. This is inefficient because it will take a very long time to complete.

4. Describe how the cost of (x + 1) can be calculated. What does this function remind you of in calculus?

$$\frac{C(x+1) - C(x)}{(x+1) - x}$$

$$\lim_{h\to 0} \frac{f(x+h) - f(x)}{h}$$

5. How can we use Calculus to find the marginal cost function?

   The marginal cost function could be approximated by the derivative of the cost functions. In other words, C'(x) is the marginal cost function.

6. Find the marginal cost function of C(x). [recall: Power rule $\frac{d}{dx}x^n = nx^{(n-1)}$]

$$C'(x) = 0.000009x^2 - 0.08x + 200$$

7. Verify the marginal cost of 4001st and 8001st item using your Marginal Cost Function.

   C'(4001) = 24 C'(8001) =136

8. How can we use the function above to find the item that will incur the lowest marginal cost?

   Since C'(x) is a quadratic function the solution will be the vertex of the graph which can be found algebraically or graphically.