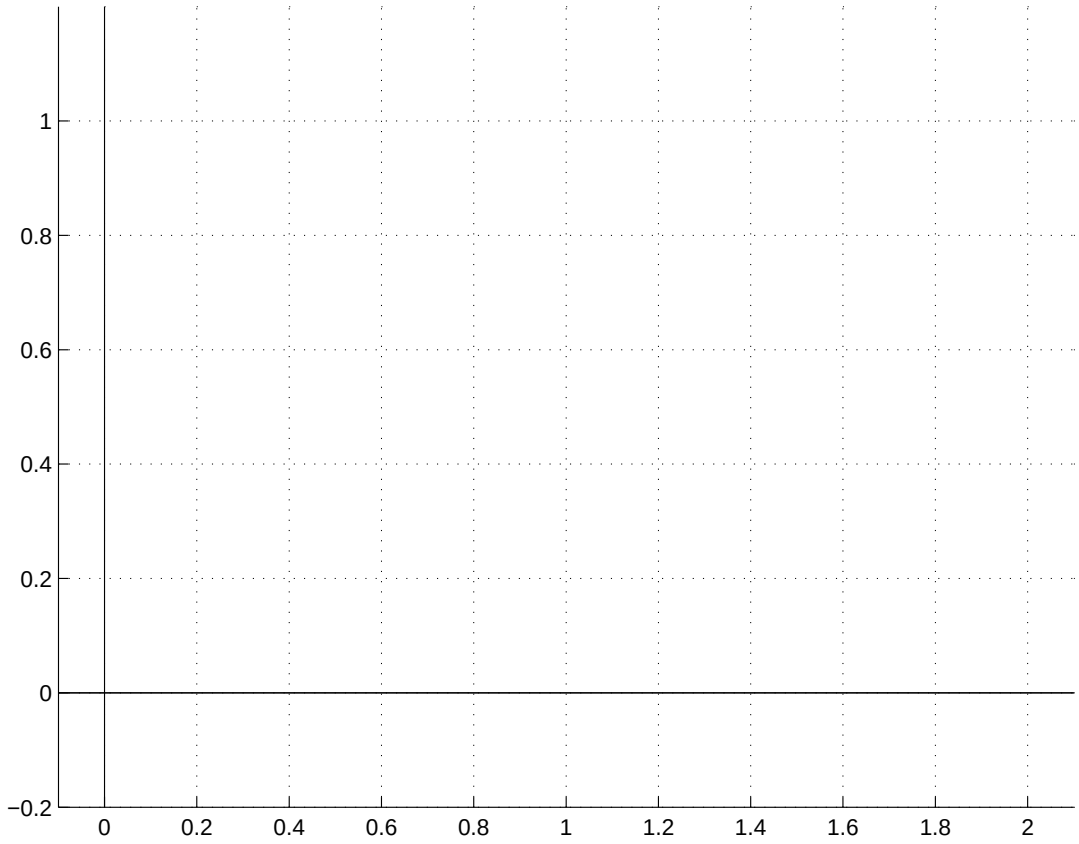
NAME AND SECTION:_____

INSTRUCTOR'S NAME:_____

1. Draw the graph of the function $f(t) = 2t - t^2$ below:



2. Knowing that

$$\int_a^b t\,dt = \frac{b^2 - a^2}{2} \quad \text{and} \quad \int_a^b t^2\,dt = \frac{b^3 - a^3}{3},$$

for $x \geq 1$, compute the following integral

$$A(x) = \int_1^x (2t - t^2)\,dt,$$

that is, find an expression for $A(x)$ that does not involve the definite integral.

3. Now that you have computed an expression for $A(x)$, compute the derivative $A'(x)$. Is there anything worth noticing about it?

4. You can think of the value $A(x)$ as the area related to a certain region of the graph. Draw and sketch, on your figure, this region and the region whose area corresponds to $A(x+h) - A(x)$ (pick an x in between 1 and 2 but think of it as a variable).

5. Approximate this region using a rectangle. Compute the area of this rectangle and argue that
$$A(x+h) - A(x) \approx (2x - x^2)h$$

6. How does this explain what you have noticed in question 3?