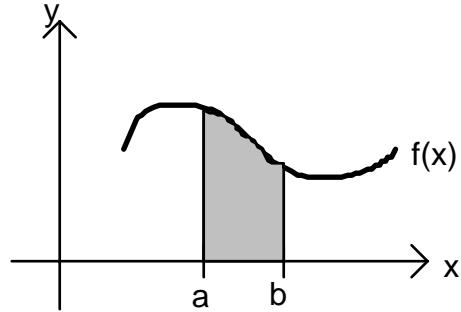


1. (i) Draw an incremental change in area ( $\Delta A$ ) on the picture using an incremental change in  $x$  along the  $x$  axis.



(ii) Using the picture write an equation for  $\Delta A$ :  $\Delta A \approx$

Divide both sides by  $\Delta x$  :  $\frac{\Delta A}{\Delta x} \approx$

Take the limit as  $\Delta x \rightarrow 0$ :  $\lim_{\Delta x \rightarrow 0} \frac{\Delta A}{\Delta x} =$

(iii) Explain how this relates to the Fundamental Theorem of Calculus.

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2. (i) Draw the graph of  $f(t) = \frac{1}{2}t + 3$ .
- (ii) Place  $t = x$  arbitrarily on the graph with  $x > 1$ .
- (iii) Shade the area that is enclosed by the  $t$ -axis,  $t=1$ ,  $t=x$ , and  $f(t)$ .
- (iv) Calculate the area geometrically using the formulas for area of a rectangle and area of a triangle. Call it  $A(x)$ .
- (v) Calculate  $A'(x)$ .
- (vi) What would  $A(x)$  be if we had used  $t=2$  instead of  $t = 1$  on our graph? (Hint: Use the Fundamental Theorem of Calculus to find the new  $A(x)$  instead of starting over with a new picture.)