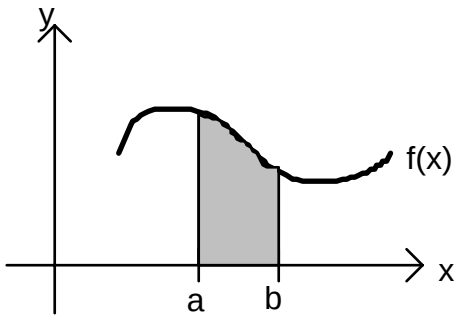
Homework 10 due April 14, 1998 Name _____

Understanding the Fundamental Theorem of Calculus

1. (i) Draw an incremental change in area (ΔA) on the picture using an incremental change in *x* along the *x* axis.



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

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

Take the limit as $\Delta x \to 0$: $\lim_{\Delta x \to 0} \dfrac{\Delta A}{\Delta x} =$

(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.)