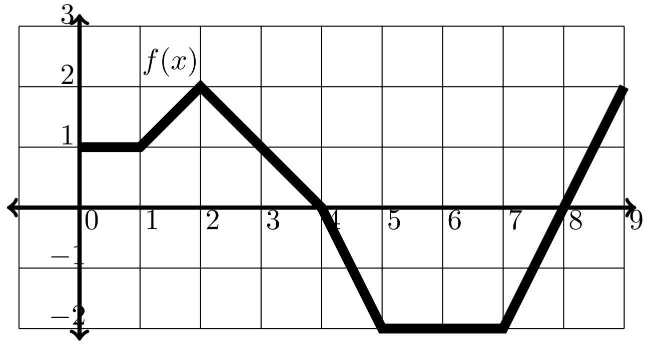
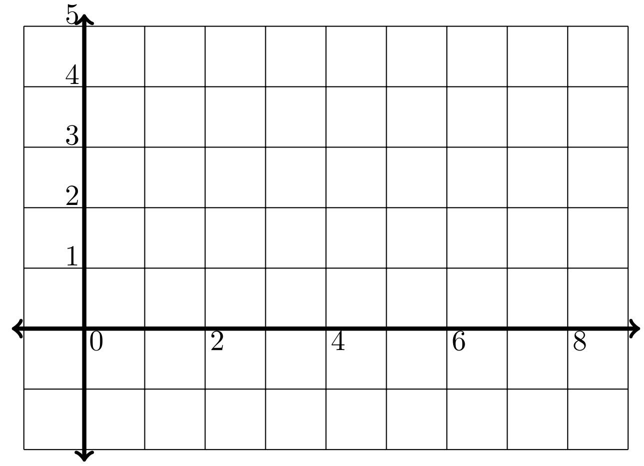
SECTION 5.3: THE FUNDAMENTAL THEOREM OF CALCULUS

1. Let $f(x)$ be given by the graph below and define $A(x) = \int_0^x f(t)dt$.





(a) Compute the following using the graph of $f(x)$. Then sketch $A(x)$.

$f(0) =$ ______	$f(5) =$ ______	$A(0) =$ ______	$A(5) =$ ______
$f(1) =$ ______	$f(6) =$ ______	$A(1) =$ ______	$A(6) =$ ______
$f(2) =$ ______	$f(7) =$ ______	$A(2) =$ ______	$A(7) =$ ______
$f(3) =$ ______	$f(8) =$ ______	$A(3) =$ ______	$A(8) =$ ______
$f(4) =$ ______	$f(9) =$ ______	$A(4) =$ ______	$A(9) =$ ______

(b) Where is $A(x)$ increasing? ______

(c) Describe f when $A(x)$ is increasing. ______

(d) Where is $A(x)$ decreasing? ______

(e) Describe f when $A(x)$ is decreasing. ______

(f) Where does $A(x)$ have a local maximum? ______

(g) Describe f when $A(x)$ has a local max. ______

(h) Where does $A(x)$ have a local minimum? ______

(i) Describe f when $A(x)$ has a local min. ______

(j) What can you say about the **rate of change** of $A(x)$?

2. The Fundamental Theorem of Calculus (part 1):

3. Find the derivative of each function below.

(a) $g(x) = \int_2^x (t^2 - \tan(t))\, dt$

(b) $h(x) = \int_0^{\sin(x)} \sqrt{t^3 + 1}\, dt$

4. The Fundamental Theorem of Calculus (part 2):

5. Evaluate the integrals.

(a) $g(x) = \int_0^{\pi} \sin(x)\, dx$

(b) $h(x) = \int_{-1}^{3} x + e^x\, dx$