

### Math 163A Class Drill 3a: Finding Derivatives Graphically Using a Ruler

The goal is: given the graph of  $f$  on the top axes, make a graph of  $f'$  on the bottom axes.

On the graph of  $f'$ , the inputs will be  $x$  and the outputs will be  $f'(x)$ . Remember how  $f'(x)$  is defined

Definition of the derivative

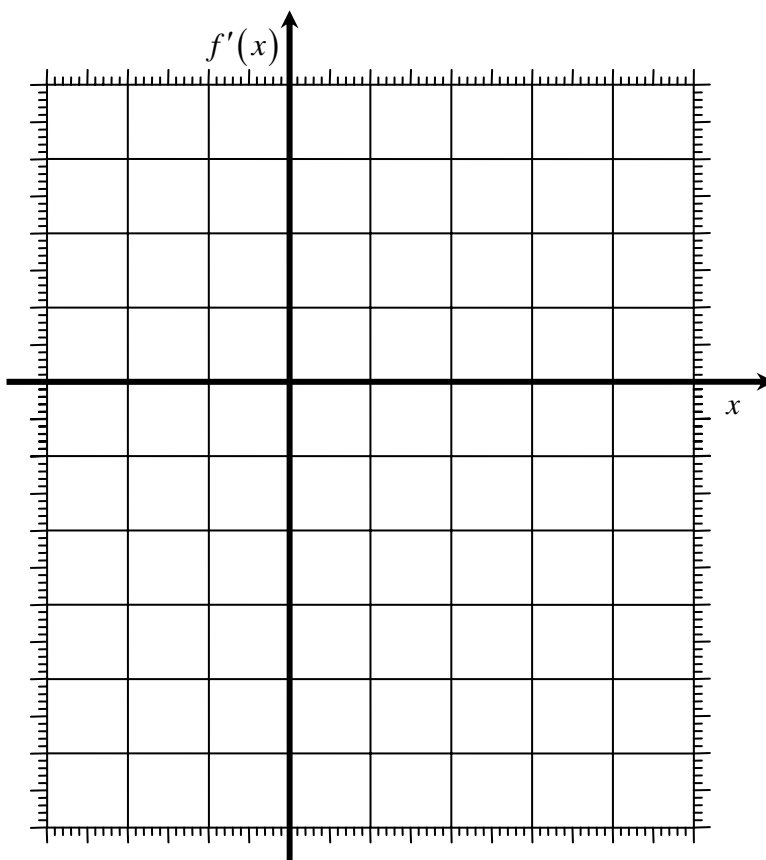
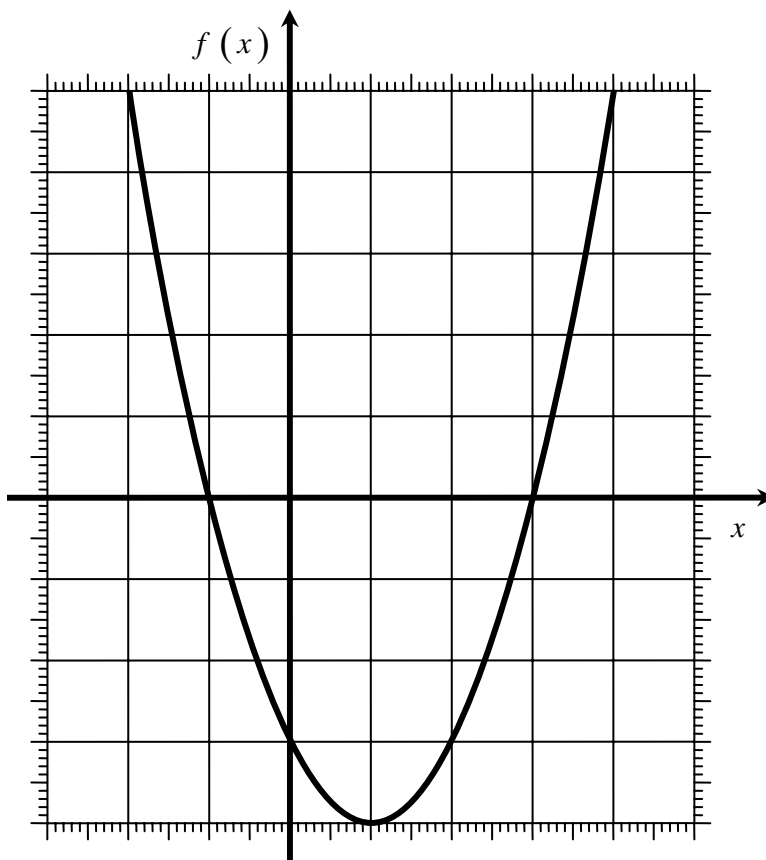
- symbol:  $f'(a)$
- graphical interpretation: the slope  $m$  of the line tangent to the graph of  $f$  at the point where  $x = a$ .

So we will build the graph of  $f'$  by filling out the following table.

input $x$	How we'll find $f'(x)$ : Draw the line tangent to the graph of $f$ at the point $(x, f(x))$ and find its slope, $m$ .	value of $m$	output $f'(x)$
-2	Draw the line tangent to the graph of $f$ at the point where $x = -2$ and find its slope, $m$ .		
-1	Draw the line tangent to the graph of $f$ at the point where $x = -1$ and find its slope, $m$ .		
0	Draw the line tangent to the graph of $f$ at the point where $x = -0$ and find its slope, $m$ .		
1	Draw the line tangent to the graph of $f$ at the point where $x = 1$ and find its slope, $m$ .		
2	Draw the line tangent to the graph of $f$ at the point where $x = 2$ and find its slope, $m$ .		
3	Draw the line tangent to the graph of $f$ at the point where $x = 3$ and find its slope, $m$ .		
4	Draw the line tangent to the graph of $f$ at the point where $x = 4$ and find its slope, $m$ .		

**Math 163A Class Drill 3a: Finding Derivatives Graphically Using a Ruler**

Given the graph of  $f$  on the top axes, make a graph of  $f'$  on the bottom axes.



### Math 163A Class Drill 3b: Finding Derivatives Graphically Using a Ruler

The goal is: given the graph of  $f$  on the top axes, make a graph of  $f'$  on the bottom axes.

On the graph of  $f'$ , the inputs will be  $x$  and the outputs will be  $f'(x)$ . Remember how  $f'(x)$  is defined

Definition of the derivative

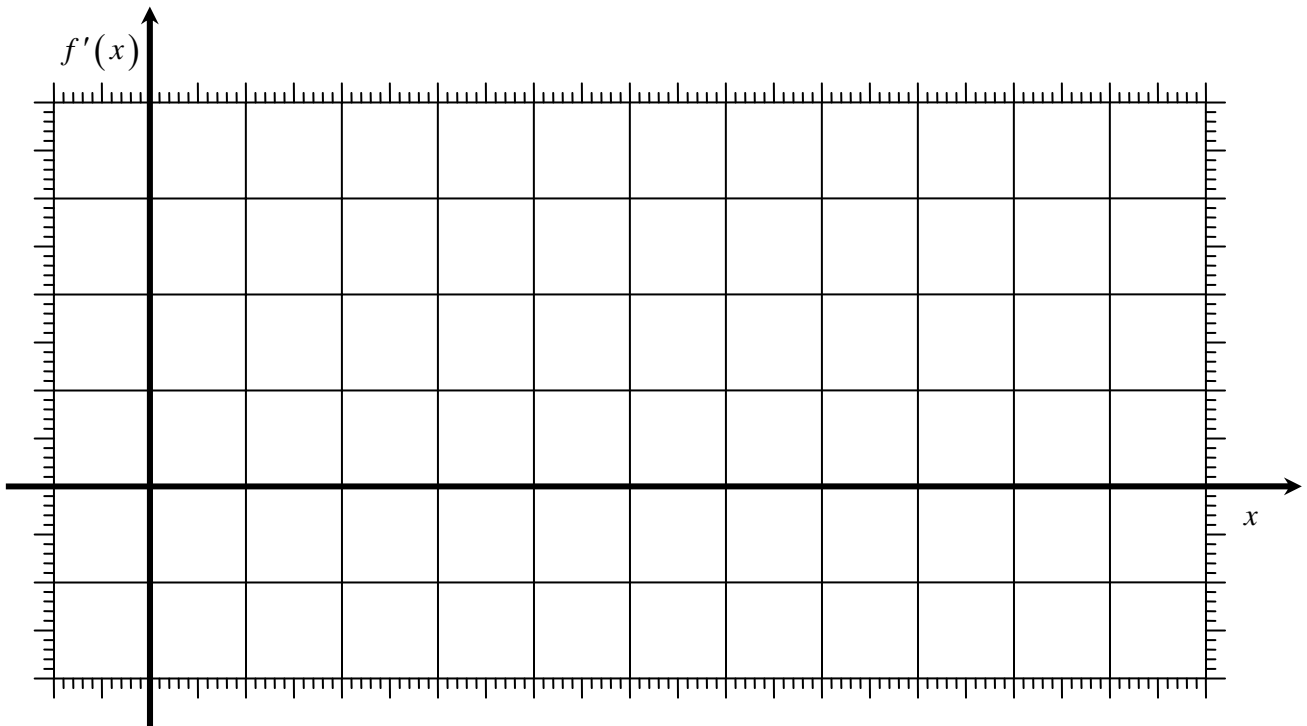
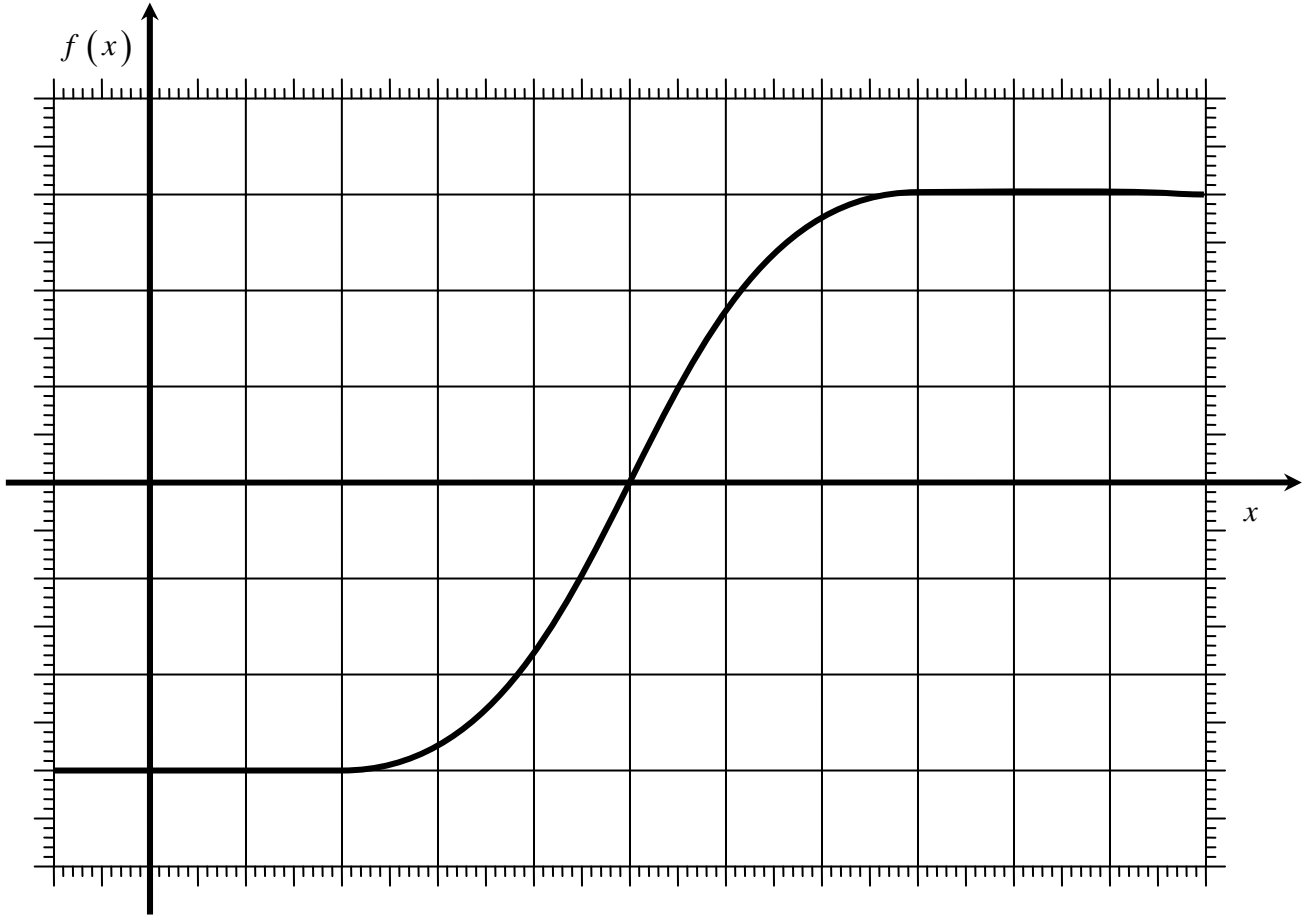
- symbol:  $f'(a)$
- graphical interpretation: the slope  $m$  of the line tangent to the graph of  $f$  at the point where  $x = a$ .

So we will build the graph of  $f'$  by filling out the following table.

input $x$	How we'll find $f'(x)$ : Draw the line tangent to the graph of $f$ at the point $(x, f(x))$ and find its slope, $m$ .	value of $m$	output $f'(x)$
0	Draw the line tangent to the graph of $f$ at the point where $x = 0$ and find its slope, $m$ .		
1	Draw the line tangent to the graph of $f$ at the point where $x = 1$ and find its slope, $m$ .		
2	Draw the line tangent to the graph of $f$ at the point where $x = 2$ and find its slope, $m$ .		
3	Draw the line tangent to the graph of $f$ at the point where $x = 3$ and find its slope, $m$ .		
4	Draw the line tangent to the graph of $f$ at the point where $x = 4$ and find its slope, $m$ .		
5	Draw the line tangent to the graph of $f$ at the point where $x = 5$ and find its slope, $m$ .		
6	Draw the line tangent to the graph of $f$ at the point where $x = 6$ and find its slope, $m$ .		
7	Draw the line tangent to the graph of $f$ at the point where $x = 7$ and find its slope, $m$ .		
8	Draw the line tangent to the graph of $f$ at the point where $x = 8$ and find its slope, $m$ .		
9	Draw the line tangent to the graph of $f$ at the point where $x = 9$ and find its slope, $m$ .		
10	Draw the line tangent to the graph of $f$ at the point where $x = 10$ and find its slope, $m$ .		

**Math 163A Class Drill 3b: Finding Derivatives Graphically Using a Ruler**

Given the graph of  $f$  on the top axes, make a graph of  $f'$  on the bottom axes.



### Math 163A Class Drill 3c: Finding Derivatives Graphically Using a Ruler

The goal is: given the graph of  $f$  on the top axes, make a graph of  $f'$  on the bottom axes.

On the graph of  $f'$ , the inputs will be  $x$  and the outputs will be  $f'(x)$ . Remember how  $f'(x)$  is defined

Definition of the derivative

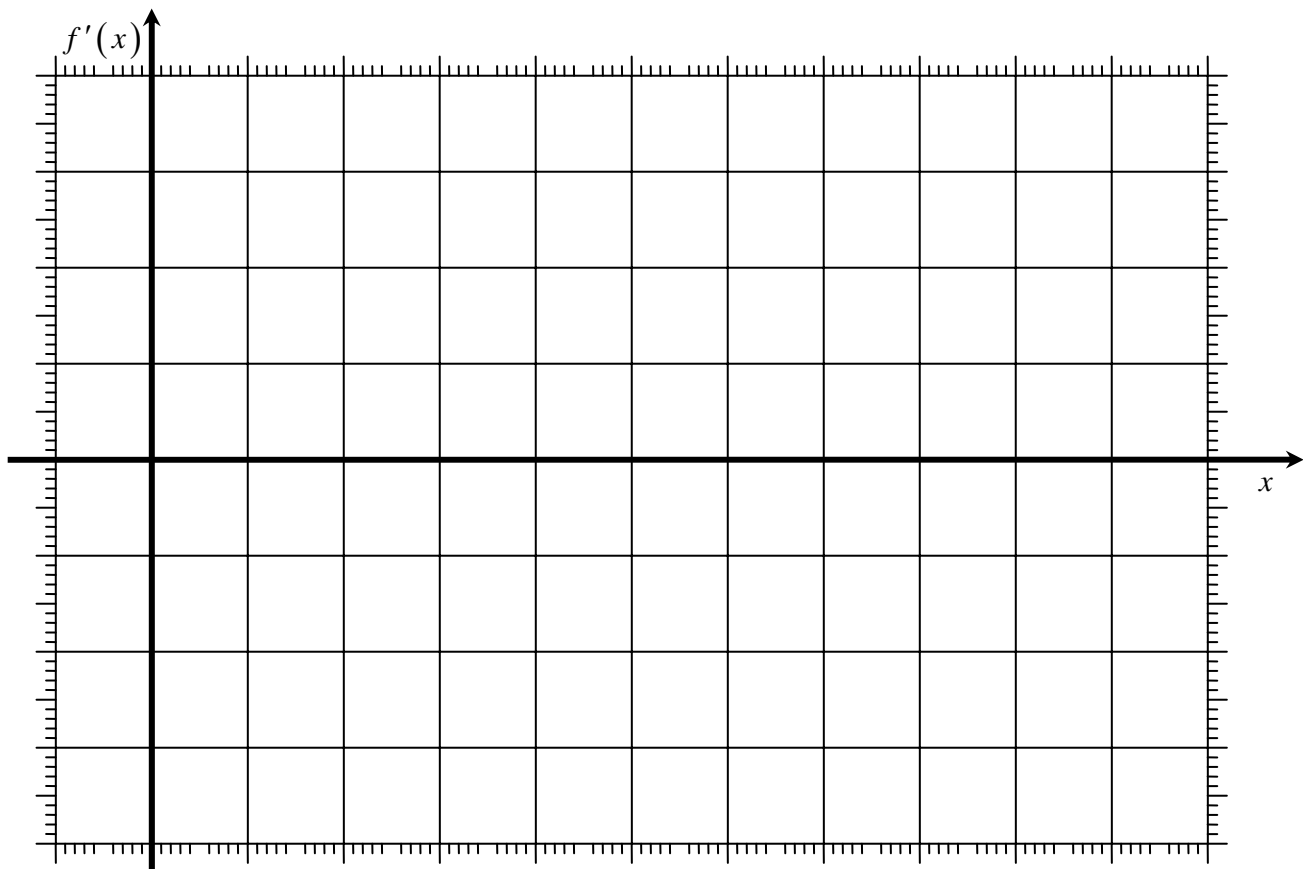
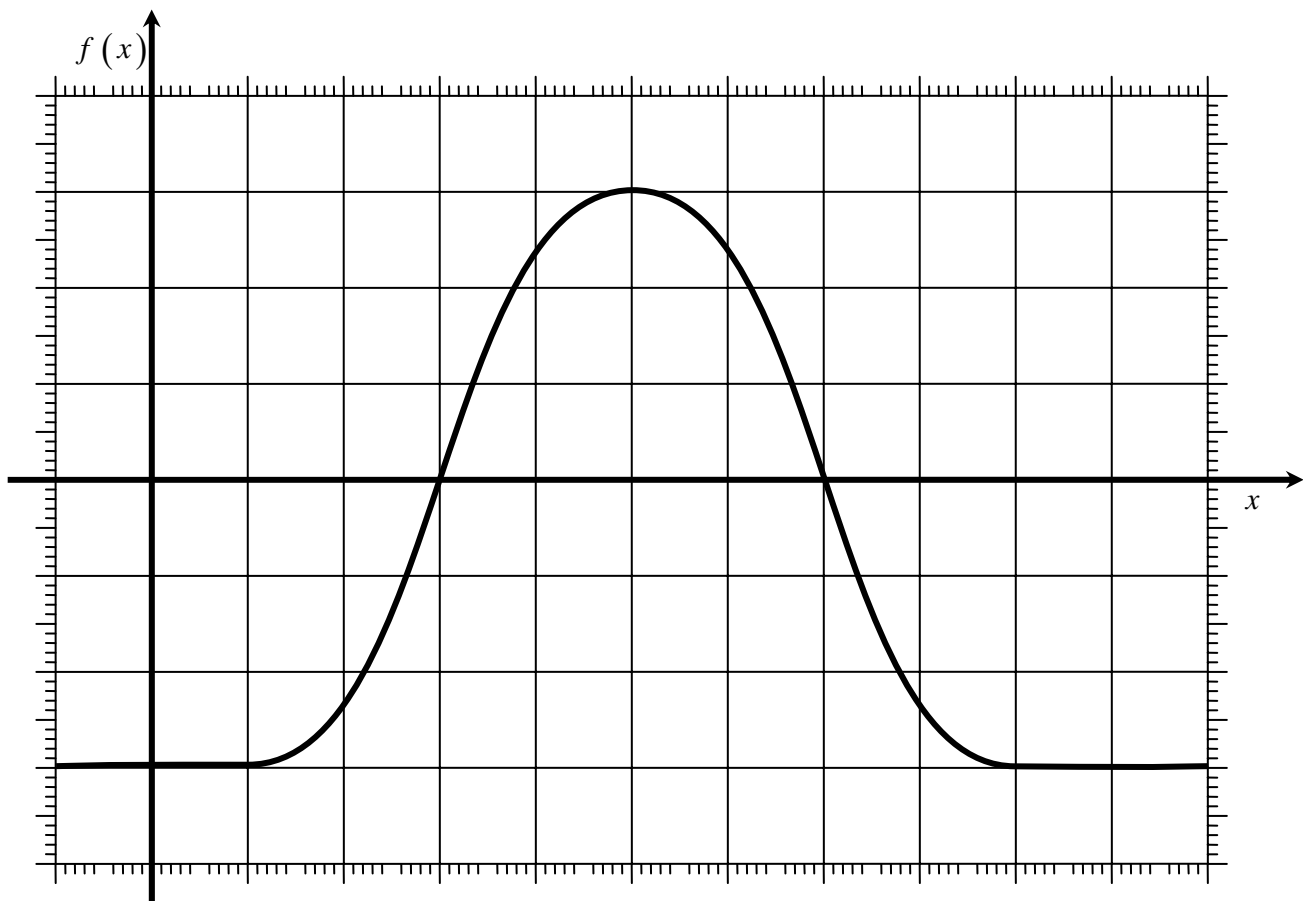
- symbol:  $f'(a)$
- graphical interpretation: the slope  $m$  of the line tangent to the graph of  $f$  at the point where  $x = a$ .

So we will build the graph of  $f'$  by filling out the following table.

input $x$	How we'll find $f'(x)$ : Draw the line tangent to the graph of $f$ at the point $(x, f(x))$ and find its slope, $m$ .	value of $m$	output $f'(x)$
0	Draw the line tangent to the graph of $f$ at the point where $x = 0$ and find its slope, $m$ .		
1	Draw the line tangent to the graph of $f$ at the point where $x = 1$ and find its slope, $m$ .		
2	Draw the line tangent to the graph of $f$ at the point where $x = 2$ and find its slope, $m$ .		
3	Draw the line tangent to the graph of $f$ at the point where $x = 3$ and find its slope, $m$ .		
4	Draw the line tangent to the graph of $f$ at the point where $x = 4$ and find its slope, $m$ .		
5	Draw the line tangent to the graph of $f$ at the point where $x = 5$ and find its slope, $m$ .		
6	Draw the line tangent to the graph of $f$ at the point where $x = 6$ and find its slope, $m$ .		
7	Draw the line tangent to the graph of $f$ at the point where $x = 7$ and find its slope, $m$ .		
8	Draw the line tangent to the graph of $f$ at the point where $x = 8$ and find its slope, $m$ .		
9	Draw the line tangent to the graph of $f$ at the point where $x = 9$ and find its slope, $m$ .		
10	Draw the line tangent to the graph of $f$ at the point where $x = 10$ and find its slope, $m$ .		

**Math 163A Class Drill 3c: Finding Derivatives Graphically Using a Ruler**

Given the graph of  $f$  on the top axes, make a graph of  $f'$  on the bottom axes.



### Math 163A Class Drill 3d: Finding Derivatives Graphically Using a Ruler

The goal is: given the graph of  $f$  on the top axes, make a graph of  $f'$  on the bottom axes.

On the graph of  $f'$ , the inputs will be  $x$  and the outputs will be  $f'(x)$ . Remember how  $f'(x)$  is defined

Definition of the derivative

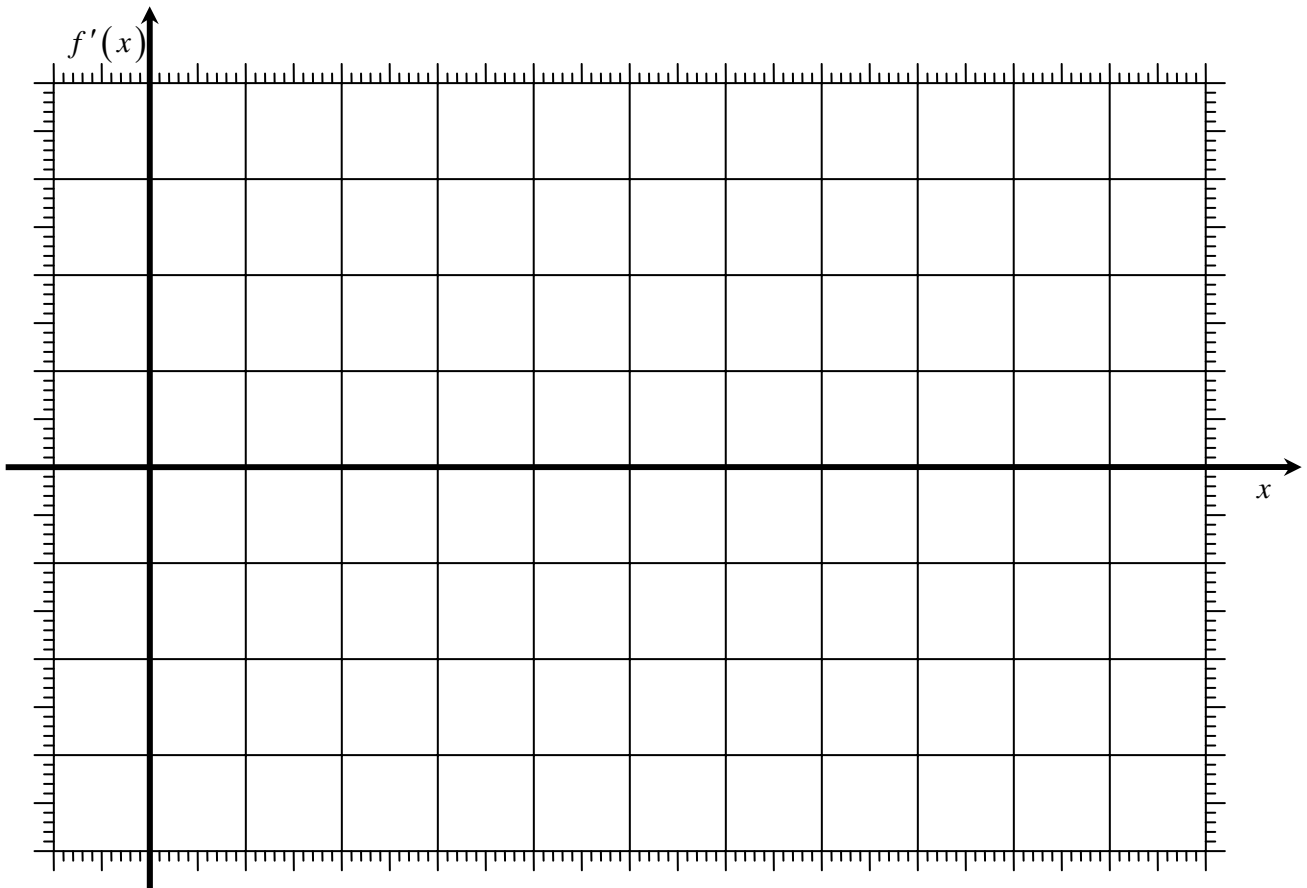
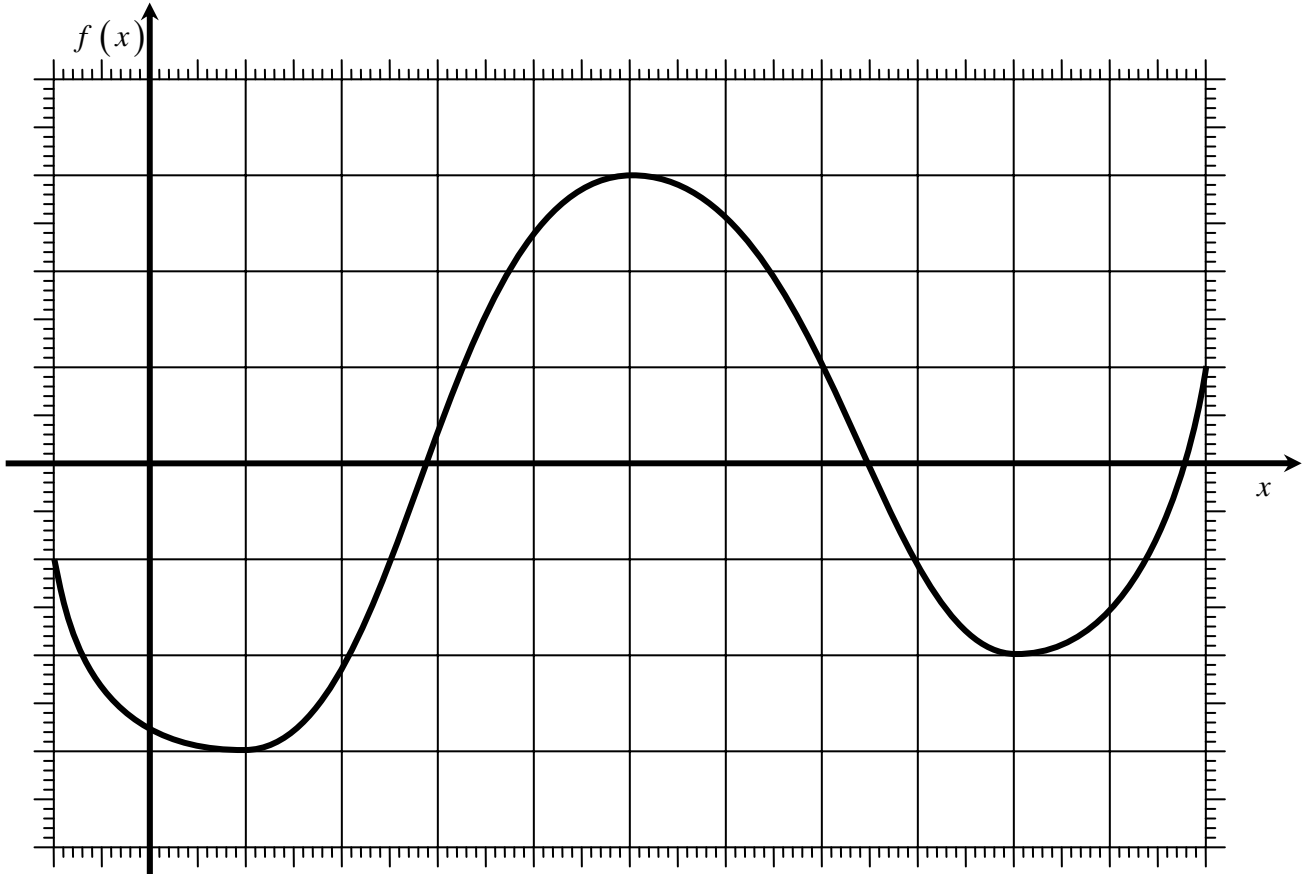
- symbol:  $f'(a)$
- graphical interpretation: the slope  $m$  of the line tangent to the graph of  $f$  at the point where  $x = a$ .

So we will build the graph of  $f'$  by filling out the following table.

input $x$	How we'll find $f'(x)$ : Draw the line tangent to the graph of $f$ at the point $(x, f(x))$ and find its slope, $m$ .	value of $m$	output $f'(x)$
0	Draw the line tangent to the graph of $f$ at the point where $x = 0$ and find its slope, $m$ .		
1	Draw the line tangent to the graph of $f$ at the point where $x = 1$ and find its slope, $m$ .		
2	Draw the line tangent to the graph of $f$ at the point where $x = 2$ and find its slope, $m$ .		
3	Draw the line tangent to the graph of $f$ at the point where $x = 3$ and find its slope, $m$ .		
4	Draw the line tangent to the graph of $f$ at the point where $x = 4$ and find its slope, $m$ .		
5	Draw the line tangent to the graph of $f$ at the point where $x = 5$ and find its slope, $m$ .		
6	Draw the line tangent to the graph of $f$ at the point where $x = 6$ and find its slope, $m$ .		
7	Draw the line tangent to the graph of $f$ at the point where $x = 7$ and find its slope, $m$ .		
8	Draw the line tangent to the graph of $f$ at the point where $x = 8$ and find its slope, $m$ .		
9	Draw the line tangent to the graph of $f$ at the point where $x = 9$ and find its slope, $m$ .		
10	Draw the line tangent to the graph of $f$ at the point where $x = 10$ and find its slope, $m$ .		

**Math 163A Class Drill 3d: Finding Derivatives Graphically Using a Ruler**

Given the graph of  $f$  on the top axes, make a graph of  $f'$  on the bottom axes.



### Math 163A Class Drill 3e: Finding Derivatives Graphically Using a Ruler

The goal is: given the graph of  $f$  on the top axes, make a graph of  $f'$  on the bottom axes.

On the graph of  $f'$ , the inputs will be  $x$  and the outputs will be  $f'(x)$ . Remember how  $f'(x)$  is defined

Definition of the derivative

- symbol:  $f'(a)$
- graphical interpretation: the slope  $m$  of the line tangent to the graph of  $f$  at the point where  $x = a$ .

So we will build the graph of  $f'$  by filling out the following table.

input $x$	How we'll find $f'(x)$ : Draw the line tangent to the graph of $f$ at the point $(x, f(x))$ and find its slope, $m$ .	value of $m$	output $f'(x)$
0	Draw the line tangent to the graph of $f$ at the point where $x = 0$ and find its slope, $m$ .		
1	Draw the line tangent to the graph of $f$ at the point where $x = 1$ and find its slope, $m$ .		
2	Draw the line tangent to the graph of $f$ at the point where $x = 2$ and find its slope, $m$ .		
3	Draw the line tangent to the graph of $f$ at the point where $x = 3$ and find its slope, $m$ .		
4	Draw the line tangent to the graph of $f$ at the point where $x = 4$ and find its slope, $m$ .		
5	Draw the line tangent to the graph of $f$ at the point where $x = 5$ and find its slope, $m$ .		
6	Draw the line tangent to the graph of $f$ at the point where $x = 6$ and find its slope, $m$ .		
7	Draw the line tangent to the graph of $f$ at the point where $x = 7$ and find its slope, $m$ .		
8	Draw the line tangent to the graph of $f$ at the point where $x = 8$ and find its slope, $m$ .		
9	Draw the line tangent to the graph of $f$ at the point where $x = 9$ and find its slope, $m$ .		
10	Draw the line tangent to the graph of $f$ at the point where $x = 10$ and find its slope, $m$ .		

**Math 163A Class Drill 3e: Finding Derivatives Graphically Using a Ruler**

Given the graph of  $f$  on the top axes, make a graph of  $f'$  on the bottom axes.

