

## Math 163A Class Drill 4a: 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  $x = a$ .

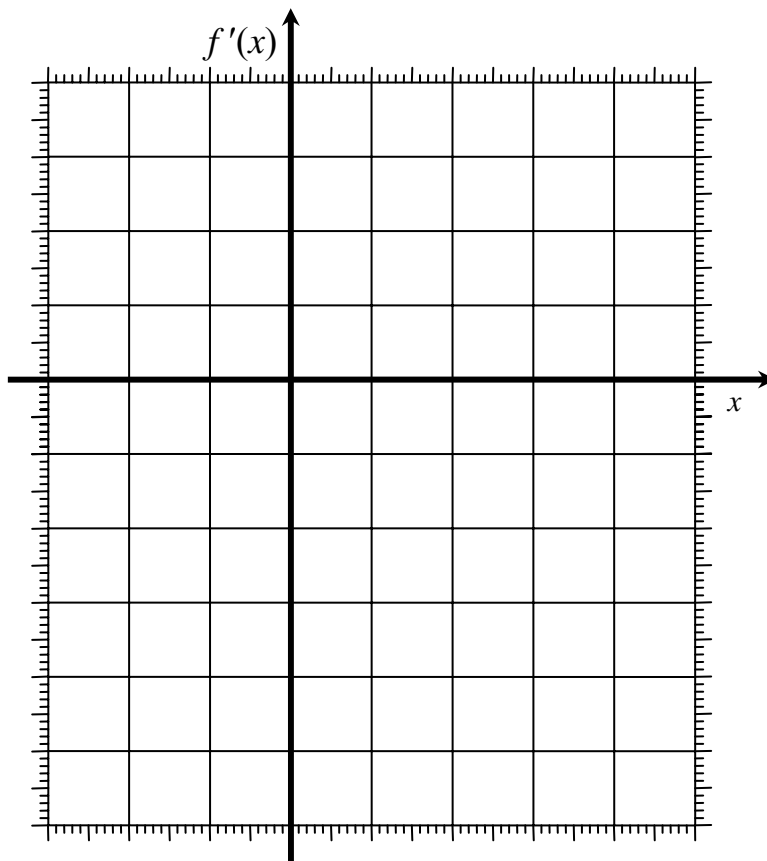
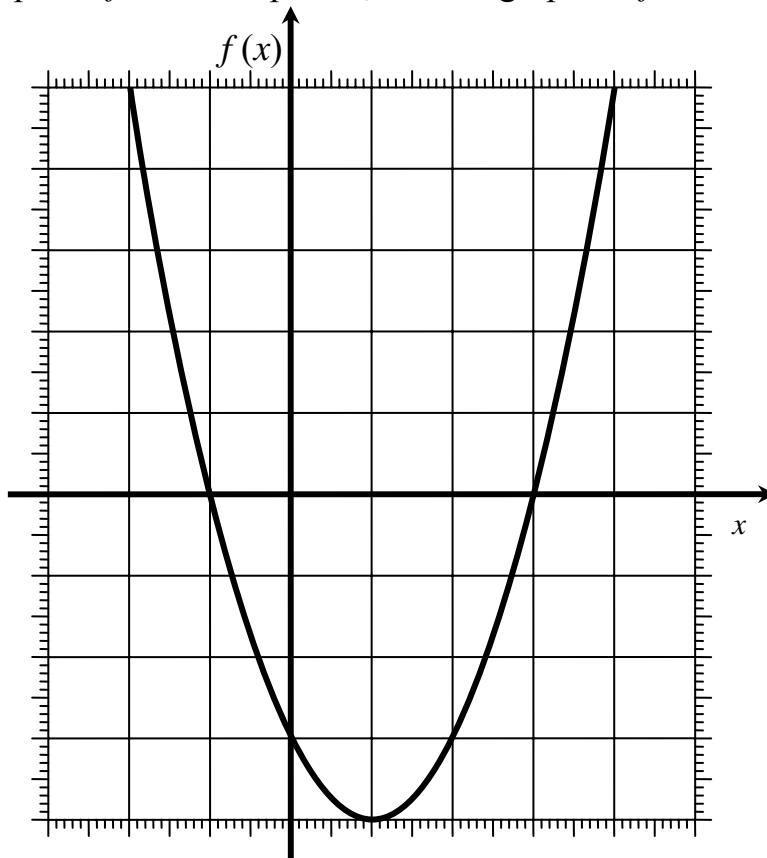
Prepare the data for your graph of  $f'$  by filling out the following table.

$x$	what to do on the graph	$f'(x)$
-2	Draw the line tangent to the graph of $f$ at the point where $x = -2$ and find its slope, $m$ . This slope $m$ will be the value of $f'(-2)$ .	
-1	Draw the line tangent to the graph of $f$ at the point where $x = -1$ and find its slope, $m$ . This slope $m$ will be the value of $f'(-1)$ .	
0	Draw the line tangent to the graph of $f$ at the point where $x = 0$ and find its slope, $m$ . This slope $m$ will be the value of $f'(0)$ .	
1	Draw the line tangent to the graph of $f$ at the point where $x = 1$ and find its slope, $m$ . This slope $m$ will be the value of $f'(1)$ .	
2	Draw the line tangent to the graph of $f$ at the point where $x = 2$ and find its slope, $m$ . This slope $m$ will be the value of $f'(2)$ .	
3	Draw the line tangent to the graph of $f$ at the point where $x = 3$ and find its slope, $m$ . This slope $m$ will be the value of $f'(3)$ .	
4	Draw the line tangent to the graph of $f$ at the point where $x = 4$ and find its slope, $m$ . This slope $m$ will be the value of $f'(4)$ .	

Using the  $(x, f'(x))$  data from your table, make a graph of  $f'$  on the bottom axes.

**Math 163A Class Drill 4a: 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 4b: 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  $x = a$ .

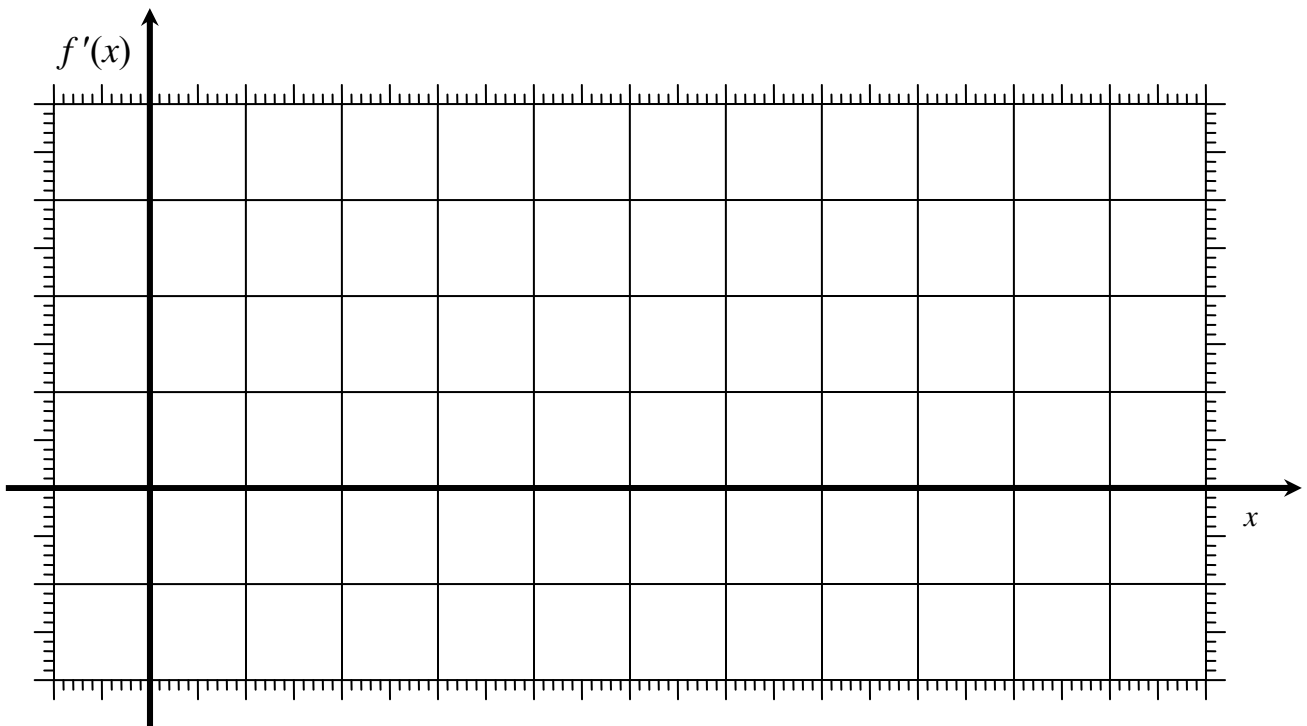
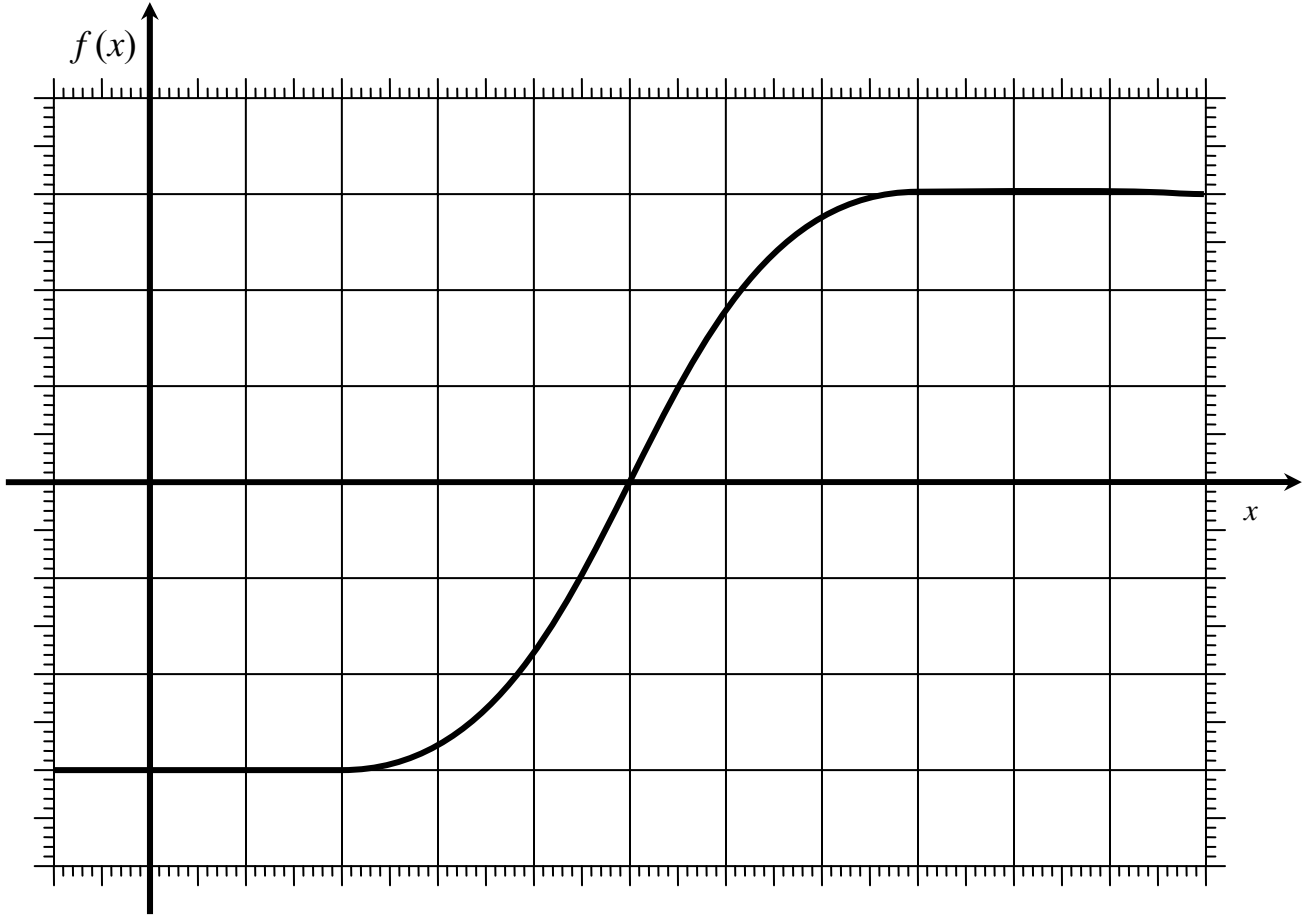
Prepare the data for your graph of  $f'$  by filling out the following table.

$x$	what to do on the graph	$f'(x)$
0	Draw the line tangent to the graph of $f$ at the point where $x = 0$ and find its slope, $m$ . This slope $m$ will be the value of $f'(0)$ .	
1	Draw the line tangent to the graph of $f$ at the point where $x = 1$ and find its slope, $m$ . This slope $m$ will be the value of $f'(1)$ .	
2	Draw the line tangent to the graph of $f$ at the point where $x = 2$ and find its slope, $m$ . This slope $m$ will be the value of $f'(2)$ .	
3	Draw the line tangent to the graph of $f$ at the point where $x = 3$ and find its slope, $m$ . This slope $m$ will be the value of $f'(3)$ .	
4	Draw the line tangent to the graph of $f$ at the point where $x = 4$ and find its slope, $m$ . This slope $m$ will be the value of $f'(4)$ .	
5	Draw the line tangent to the graph of $f$ at the point where $x = 5$ and find its slope, $m$ . This slope $m$ will be the value of $f'(5)$ .	
6	Draw the line tangent to the graph of $f$ at the point where $x = 6$ and find its slope, $m$ . This slope $m$ will be the value of $f'(6)$ .	
7	Draw the line tangent to the graph of $f$ at the point where $x = 7$ and find its slope, $m$ . This slope $m$ will be the value of $f'(7)$ .	
8	Draw the line tangent to the graph of $f$ at the point where $x = 8$ and find its slope, $m$ . This slope $m$ will be the value of $f'(8)$ .	
9	Draw the line tangent to the graph of $f$ at the point where $x = 9$ and find its slope, $m$ . This slope $m$ will be the value of $f'(9)$ .	
10	Draw the line tangent to the graph of $f$ at the point where $x = 10$ and find its slope, $m$ . This slope $m$ will be the value of $f'(10)$ .	

Using the  $(x, f'(x))$  data from your table, make a graph of  $f'$  on the bottom axes.

**Math 163A Class Drill 4b: 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 4c: 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  $x = a$ .

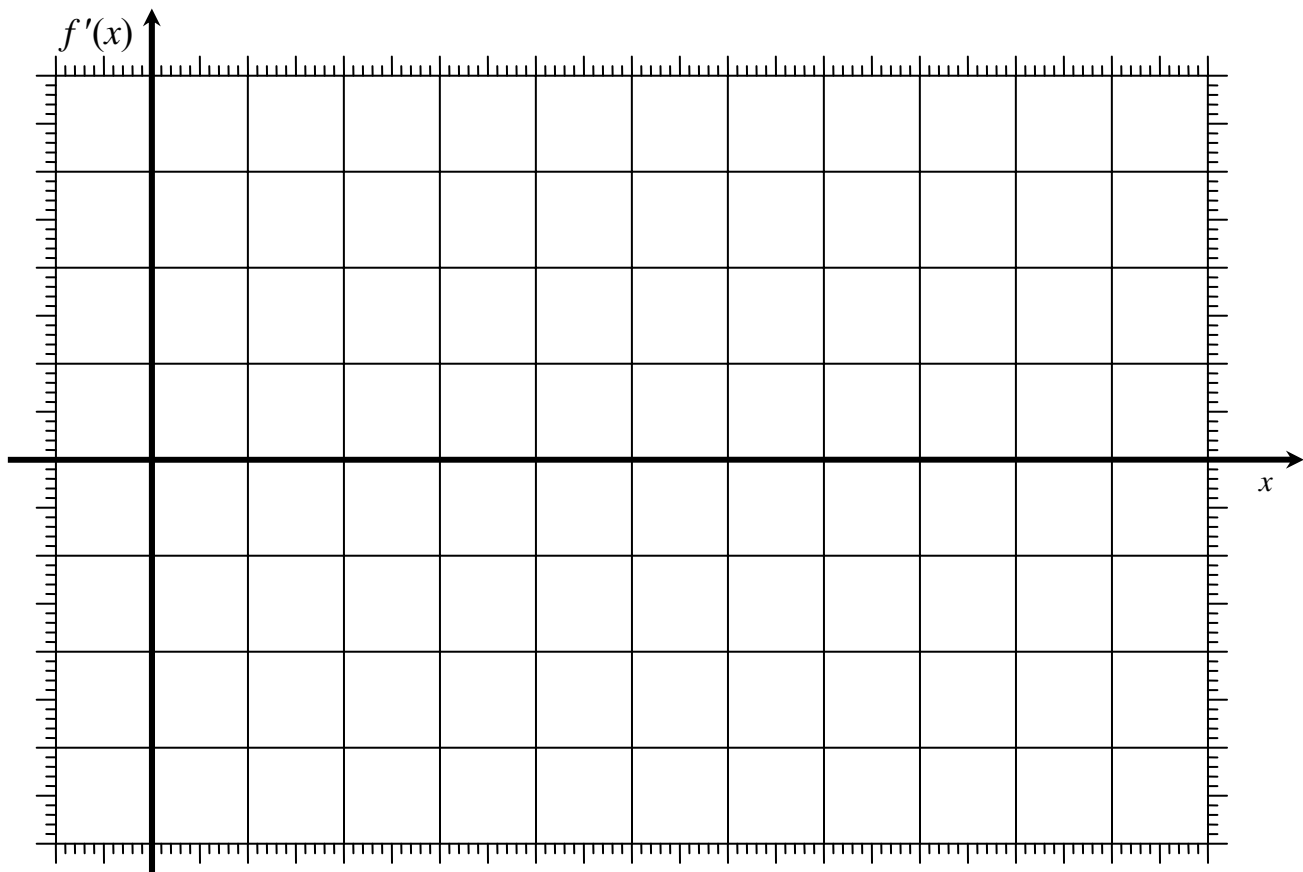
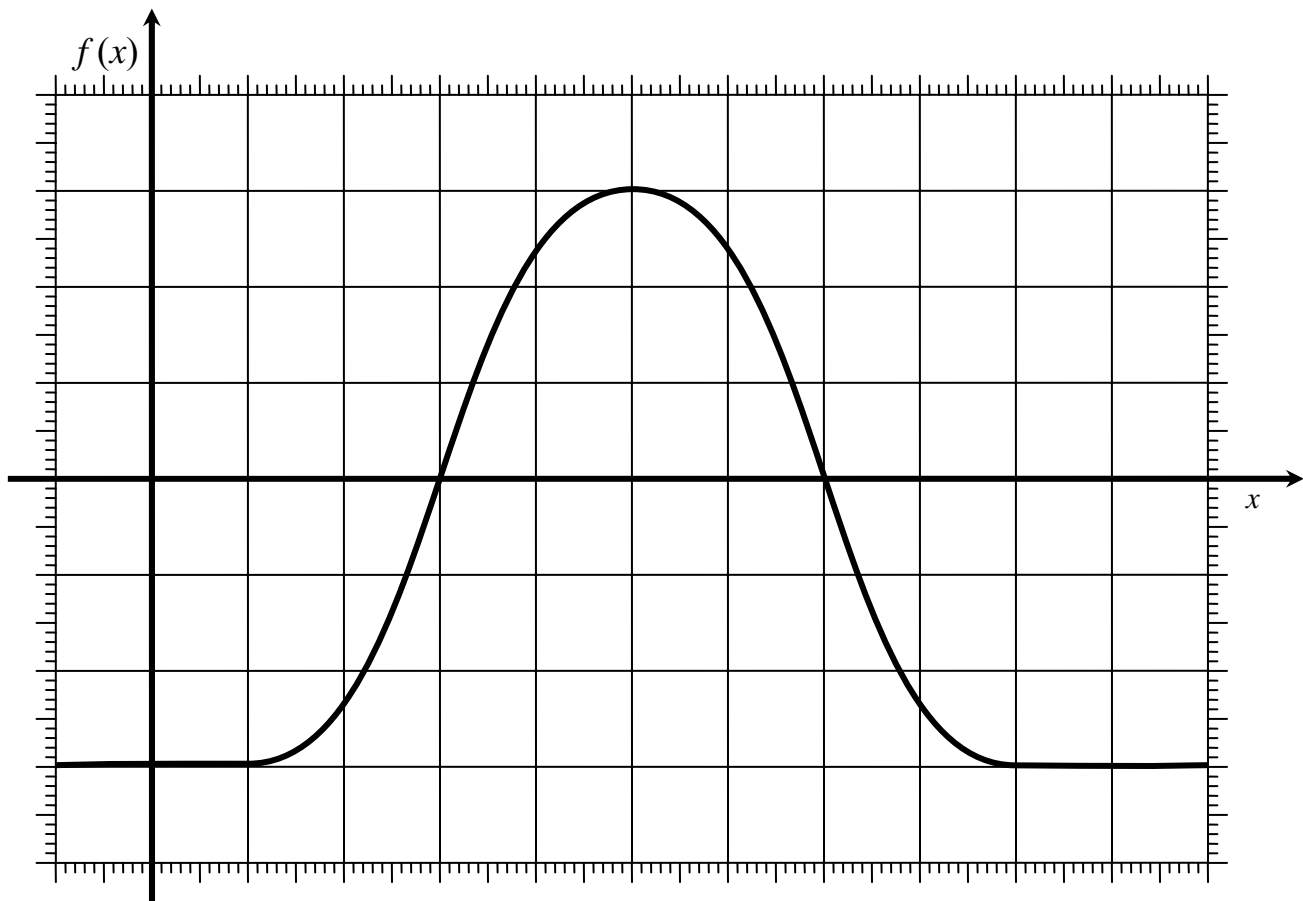
Prepare the data for your graph of  $f'$  by filling out the following table.

$x$	what to do on the graph	$f'(x)$
0	Draw the line tangent to the graph of $f$ at the point where $x = 0$ and find its slope, $m$ . This slope $m$ will be the value of $f'(0)$ .	
1	Draw the line tangent to the graph of $f$ at the point where $x = 1$ and find its slope, $m$ . This slope $m$ will be the value of $f'(1)$ .	
2	Draw the line tangent to the graph of $f$ at the point where $x = 2$ and find its slope, $m$ . This slope $m$ will be the value of $f'(2)$ .	
3	Draw the line tangent to the graph of $f$ at the point where $x = 3$ and find its slope, $m$ . This slope $m$ will be the value of $f'(3)$ .	
4	Draw the line tangent to the graph of $f$ at the point where $x = 4$ and find its slope, $m$ . This slope $m$ will be the value of $f'(4)$ .	
5	Draw the line tangent to the graph of $f$ at the point where $x = 5$ and find its slope, $m$ . This slope $m$ will be the value of $f'(5)$ .	
6	Draw the line tangent to the graph of $f$ at the point where $x = 6$ and find its slope, $m$ . This slope $m$ will be the value of $f'(6)$ .	
7	Draw the line tangent to the graph of $f$ at the point where $x = 7$ and find its slope, $m$ . This slope $m$ will be the value of $f'(7)$ .	
8	Draw the line tangent to the graph of $f$ at the point where $x = 8$ and find its slope, $m$ . This slope $m$ will be the value of $f'(8)$ .	
9	Draw the line tangent to the graph of $f$ at the point where $x = 9$ and find its slope, $m$ . This slope $m$ will be the value of $f'(9)$ .	
10	Draw the line tangent to the graph of $f$ at the point where $x = 10$ and find its slope, $m$ . This slope $m$ will be the value of $f'(10)$ .	

Using the  $(x, f'(x))$  data from your table, make a graph of  $f'$  on the bottom axes.

**Math 163A Class Drill 4c: 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 4d: 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  $x = a$ .

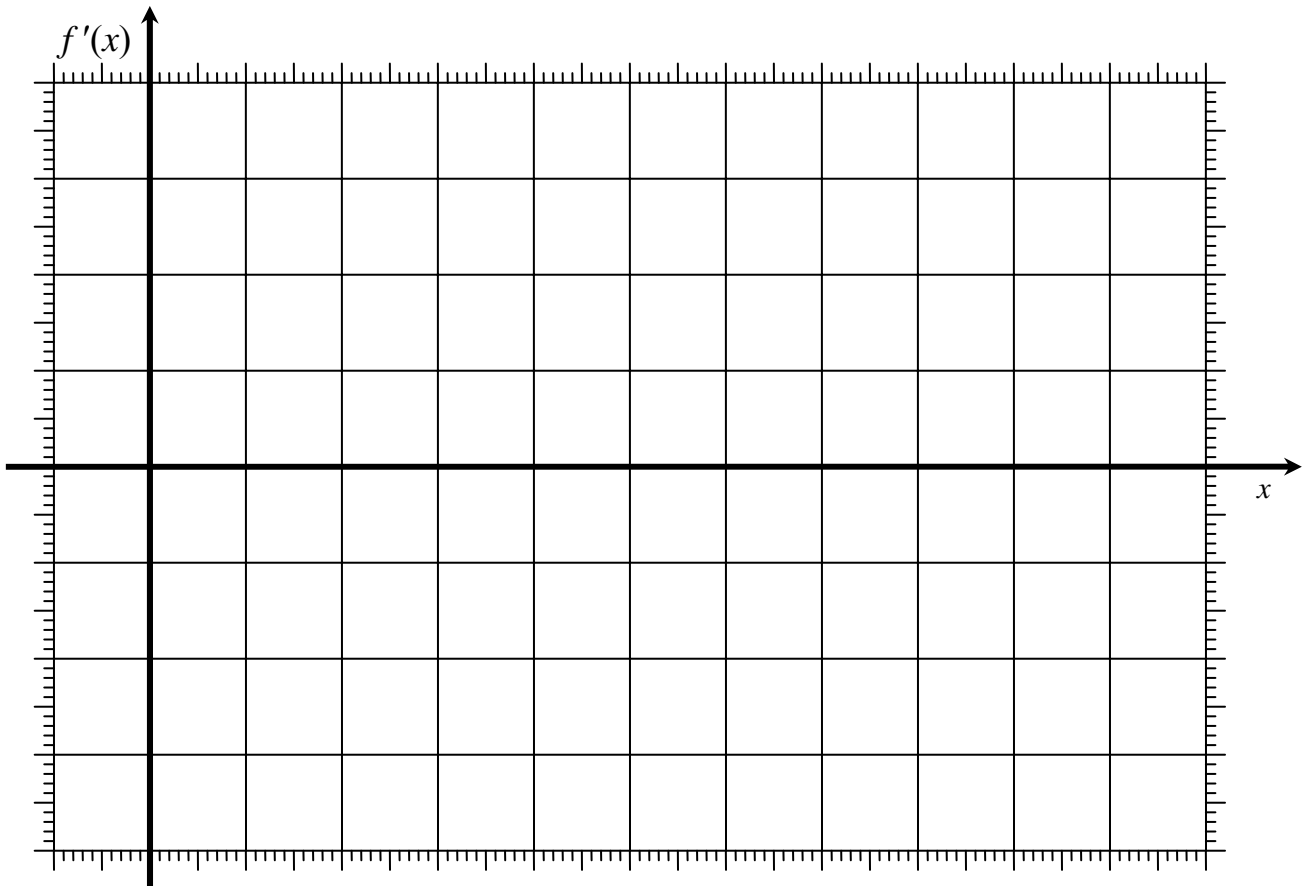
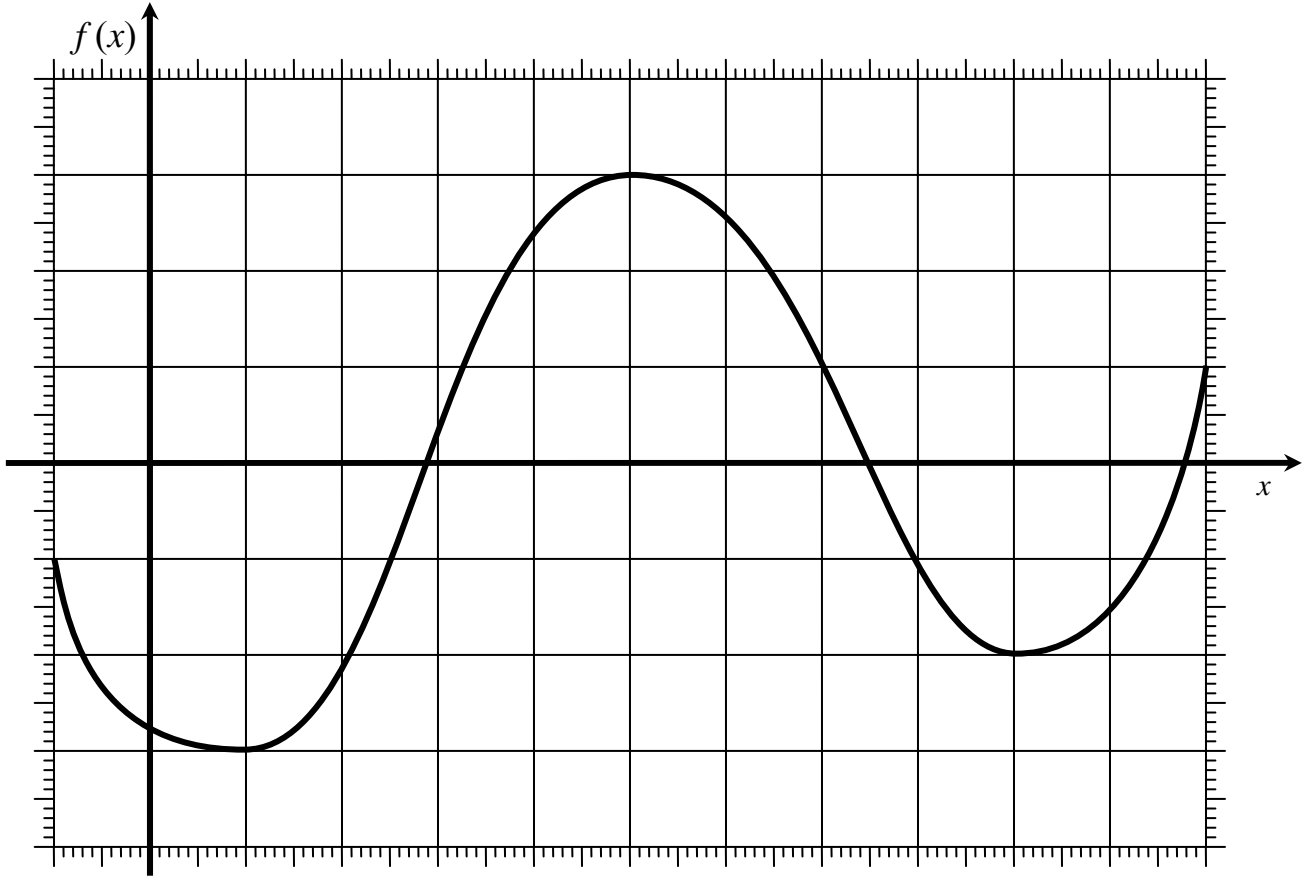
Prepare the data for your graph of  $f'$  by filling out the following table.

$x$	what to do on the graph	$f'(x)$
-1	Draw the line tangent to the graph of $f$ at the point where $x = -1$ and find its slope, $m$ . This slope $m$ will be the value of $f'(-1)$ .	
0	Draw the line tangent to the graph of $f$ at the point where $x = 0$ and find its slope, $m$ . This slope $m$ will be the value of $f'(0)$ .	
1	Draw the line tangent to the graph of $f$ at the point where $x = 1$ and find its slope, $m$ . This slope $m$ will be the value of $f'(1)$ .	
2	Draw the line tangent to the graph of $f$ at the point where $x = 2$ and find its slope, $m$ . This slope $m$ will be the value of $f'(2)$ .	
3	Draw the line tangent to the graph of $f$ at the point where $x = 3$ and find its slope, $m$ . This slope $m$ will be the value of $f'(3)$ .	
4	Draw the line tangent to the graph of $f$ at the point where $x = 4$ and find its slope, $m$ . This slope $m$ will be the value of $f'(4)$ .	
5	Draw the line tangent to the graph of $f$ at the point where $x = 5$ and find its slope, $m$ . This slope $m$ will be the value of $f'(5)$ .	
6	Draw the line tangent to the graph of $f$ at the point where $x = 6$ and find its slope, $m$ . This slope $m$ will be the value of $f'(6)$ .	
7	Draw the line tangent to the graph of $f$ at the point where $x = 7$ and find its slope, $m$ . This slope $m$ will be the value of $f'(7)$ .	
8	Draw the line tangent to the graph of $f$ at the point where $x = 8$ and find its slope, $m$ . This slope $m$ will be the value of $f'(8)$ .	
9	Draw the line tangent to the graph of $f$ at the point where $x = 9$ and find its slope, $m$ . This slope $m$ will be the value of $f'(9)$ .	
10	Draw the line tangent to the graph of $f$ at the point where $x = 10$ and find its slope, $m$ . This slope $m$ will be the value of $f'(10)$ .	
11	Draw the line tangent to the graph of $f$ at the point where $x = 11$ and find its slope, $m$ . This slope $m$ will be the value of $f'(11)$ .	

Using the  $(x, f'(x))$  data from your table, make a graph of  $f'$  on the bottom axes.

**Math 163A Class Drill 4d: 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 4e: 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  $x = a$ .

Prepare the data for your graph of  $f'$  by filling out the following table.

$x$	what to do on the graph	$f'(x)$
-1	Draw the line tangent to the graph of $f$ at the point where $x = -1$ and find its slope, $m$ . This slope $m$ will be the value of $f'(-1)$ .	
0	Draw the line tangent to the graph of $f$ at the point where $x = 0$ and find its slope, $m$ . This slope $m$ will be the value of $f'(0)$ .	
1	Draw the line tangent to the graph of $f$ at the point where $x = 1$ and find its slope, $m$ . This slope $m$ will be the value of $f'(1)$ .	
2	Draw the line tangent to the graph of $f$ at the point where $x = 2$ and find its slope, $m$ . This slope $m$ will be the value of $f'(2)$ .	
3	Draw the line tangent to the graph of $f$ at the point where $x = 3$ and find its slope, $m$ . This slope $m$ will be the value of $f'(3)$ .	
4	Draw the line tangent to the graph of $f$ at the point where $x = 4$ and find its slope, $m$ . This slope $m$ will be the value of $f'(4)$ .	
5	Draw the line tangent to the graph of $f$ at the point where $x = 5$ and find its slope, $m$ . This slope $m$ will be the value of $f'(5)$ .	
6	Draw the line tangent to the graph of $f$ at the point where $x = 6$ and find its slope, $m$ . This slope $m$ will be the value of $f'(6)$ .	
7	Draw the line tangent to the graph of $f$ at the point where $x = 7$ and find its slope, $m$ . This slope $m$ will be the value of $f'(7)$ .	
8	Draw the line tangent to the graph of $f$ at the point where $x = 8$ and find its slope, $m$ . This slope $m$ will be the value of $f'(8)$ .	
9	Draw the line tangent to the graph of $f$ at the point where $x = 9$ and find its slope, $m$ . This slope $m$ will be the value of $f'(9)$ .	
10	Draw the line tangent to the graph of $f$ at the point where $x = 10$ and find its slope, $m$ . This slope $m$ will be the value of $f'(10)$ .	
11	Draw the line tangent to the graph of $f$ at the point where $x = 11$ and find its slope, $m$ . This slope $m$ will be the value of $f'(11)$ .	

Using the  $(x, f'(x))$  data from your table, make a graph of  $f'$  on the bottom axes.

**Math 163A Class Drill 4e: Finding Derivatives Graphically Using a Ruler**

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

