

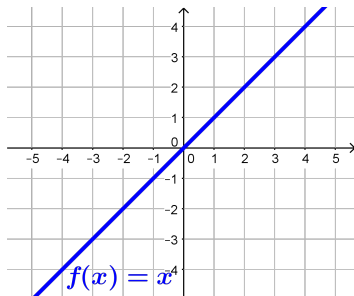
# Vertical Shifts of Graphs

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We know how to sketch the graph of the line:  $f(x) = x$

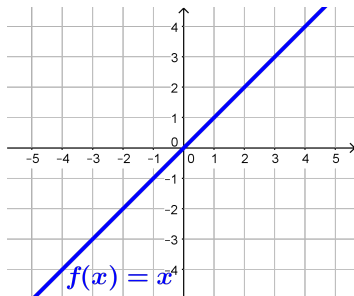
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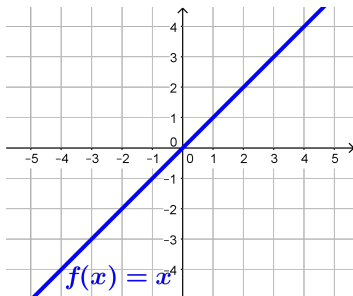
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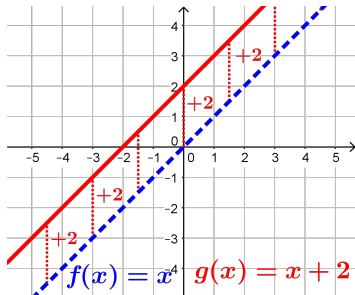
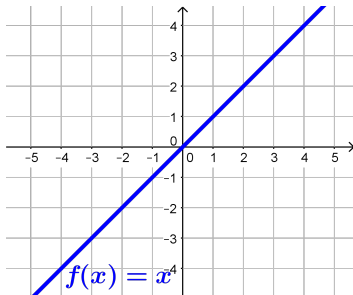


What about a new function,  $g(x) = x+2$

Each  $y$ -value on  $g(x)$  is **2 higher** than on  $f(x)$

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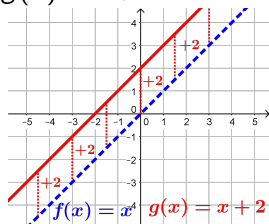
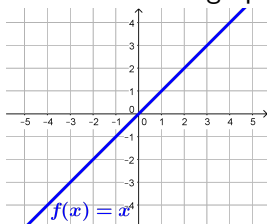
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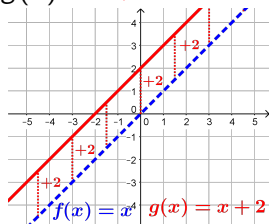
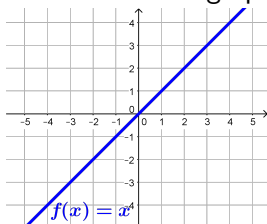
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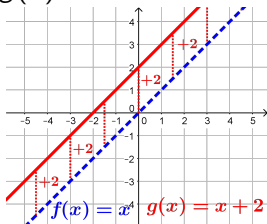
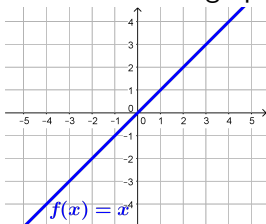
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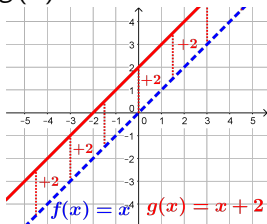
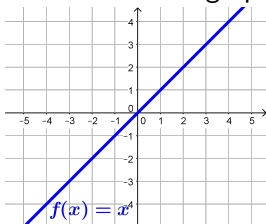
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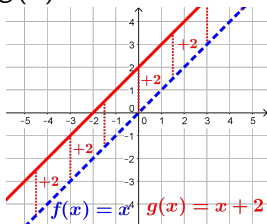
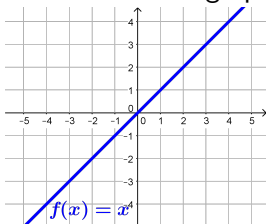


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Each  $y$ -value on  $h(x)$  is 2 less than on  $f(x)$

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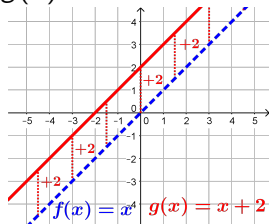
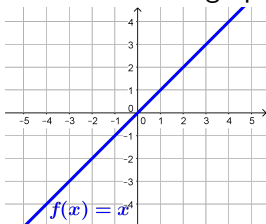
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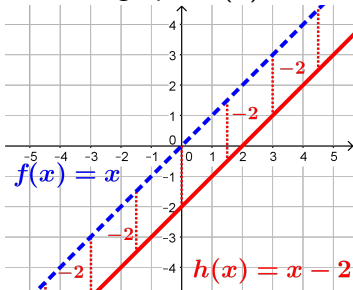
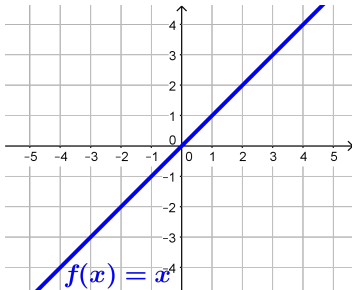
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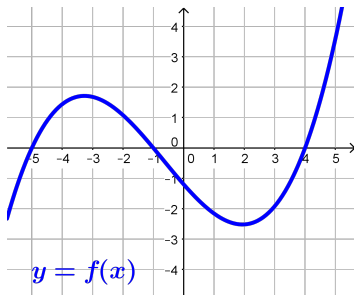
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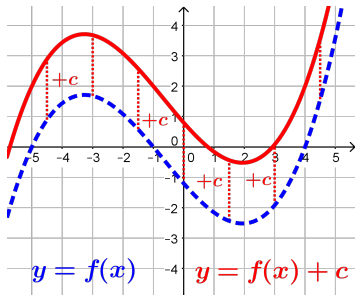
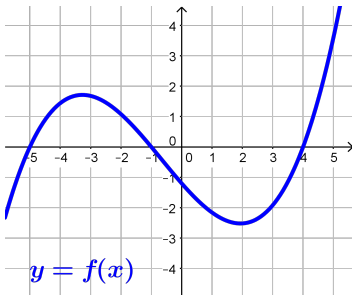
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The graph of  $y = f(x) + c$  is the graph of  $y = f(x)$  shifted in the vertical direction by  $c$

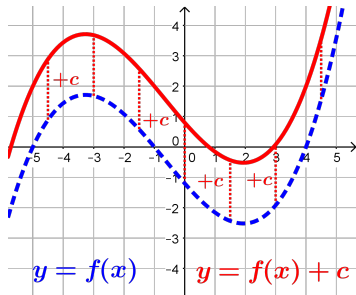
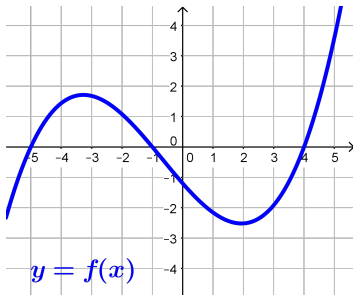




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Note: If  $c > 0$  then the graph moves up and  
if  $c < 0$  then the graph moves down