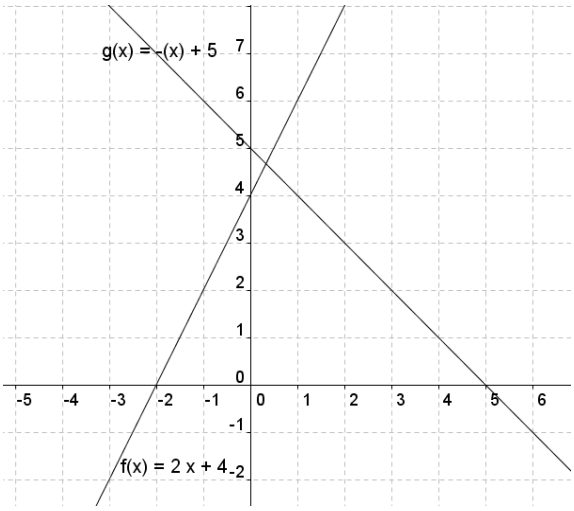
EXAMINING FUNCTIONS WITH GEOGEBRA

GeoGebra provides many opportunities to examine a function or multiple functions simultaneously. This overview discussing some of the most used possabilities. In the official manual there is a comprehensive overview.

Eksamining functions

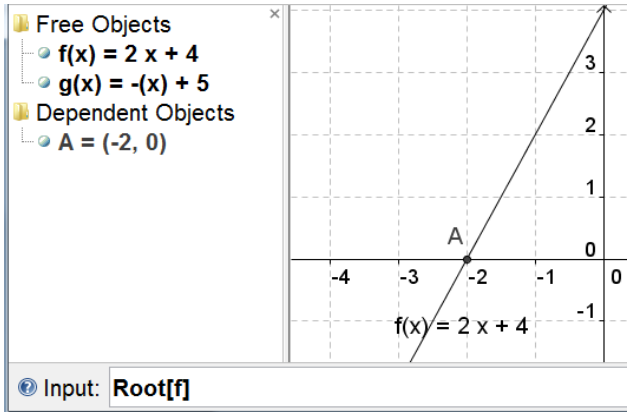
Type $f(x)=2x+4$ and $g(x)=-x+5$ in the input bar. Adjust the axes to get this image:



We will find:

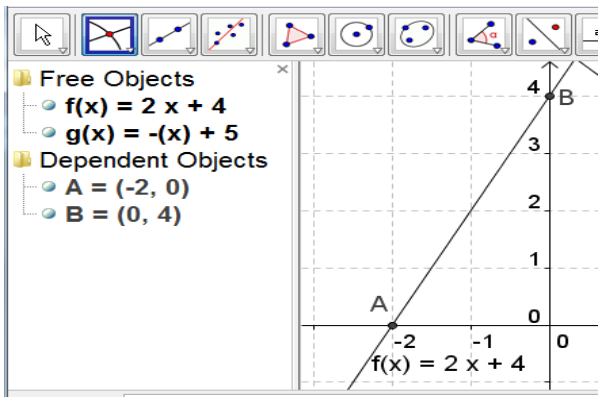
- Intersection with *x*-axis (roots).
- Intersection with *y*-axis
- Point of intersection
- A spesific *x*-value / *y*-value
- Maximum/minimum (quadratic function)
- Gradient/slope (quadratic function)

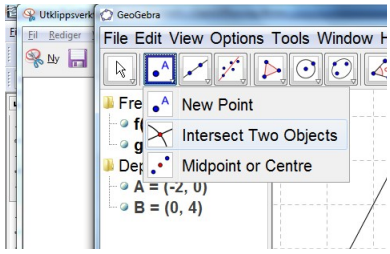
Intersection with the *x*-aksis (root)



Type Root[f] in the input field. GeoGebra will find the root of *f*(*x*), A = (-2,0).

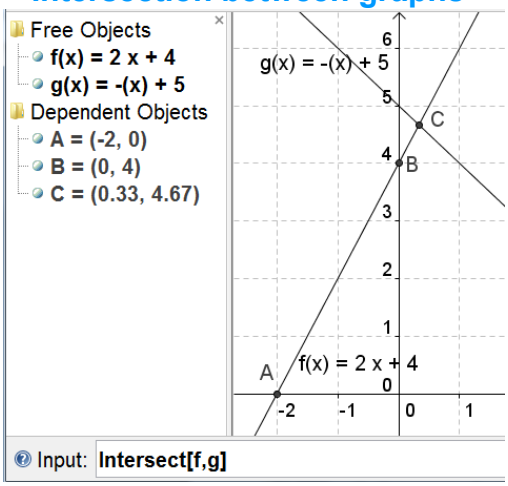
Intersection with the y-axis





Choose Intersect Two Objects. Left click the *x*-axis, then the straight line (or reverse). GeoGebra will find B =(0,4).

Intersection between graphs

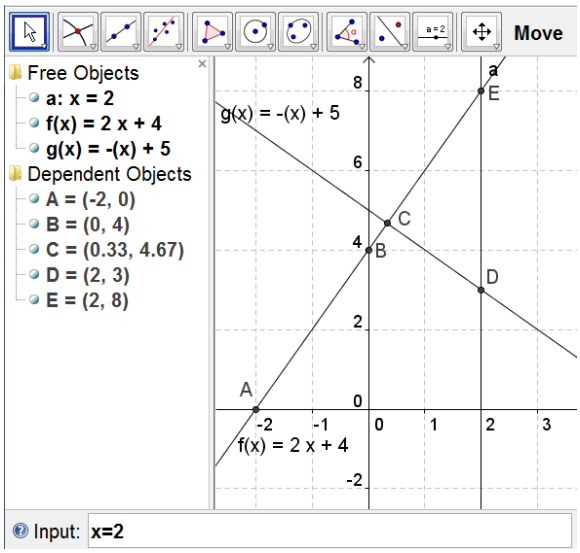


Same procedure as shown above. Alternatively use the command Intersect[f,g].

GeoGebra will find the point of intersection:
C = (0,33,4,67)

Finding the *y*-value when the *x*-value is given

Vi will find the *y*-value when *x*= 2



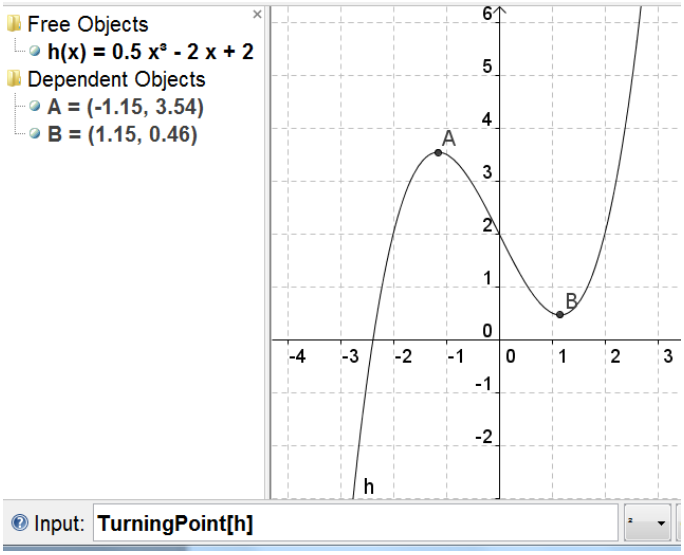
Type x=2 in the input bar, and use the tool Intersect Two Objects twice (to find both intersection points). GeoGebra finds D =(2,3) between *g* and the line x=2, and E =(2,8) between *f* and the line x=2.

The desired *y*-values are: $y = 3$ og $y = 8$.

To find *x*-values, we make a horisontal line instead of a vertical one. Try!

Maximum and minimum of polynomial functions

Straight lines hva no maximum or minimum. Therefore, we open a new window and draw the graph of the function $h(x)=0.5x^3-2x+2$

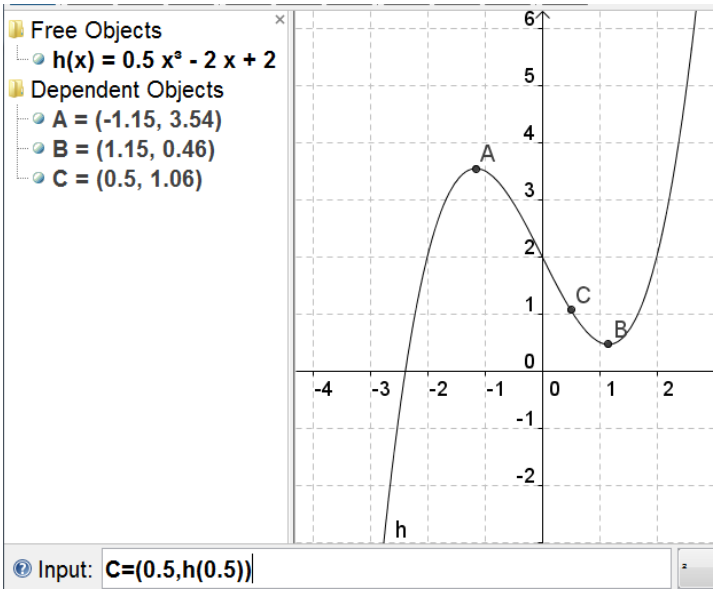


Type TurningPoint[h] in the input bar and press enter. GeoGebra finds maximum and minium (if they exist). The function *h* have

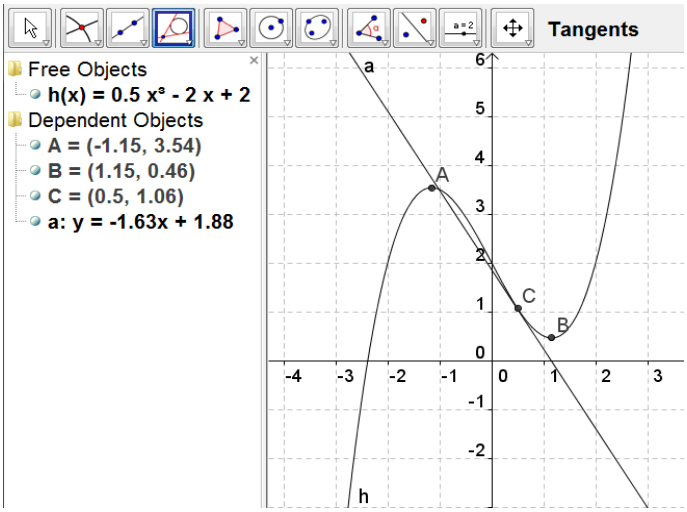
Maximum A = (-1,15,3,54)
Minimum B = (1,15,0,46)

Gradient / slope

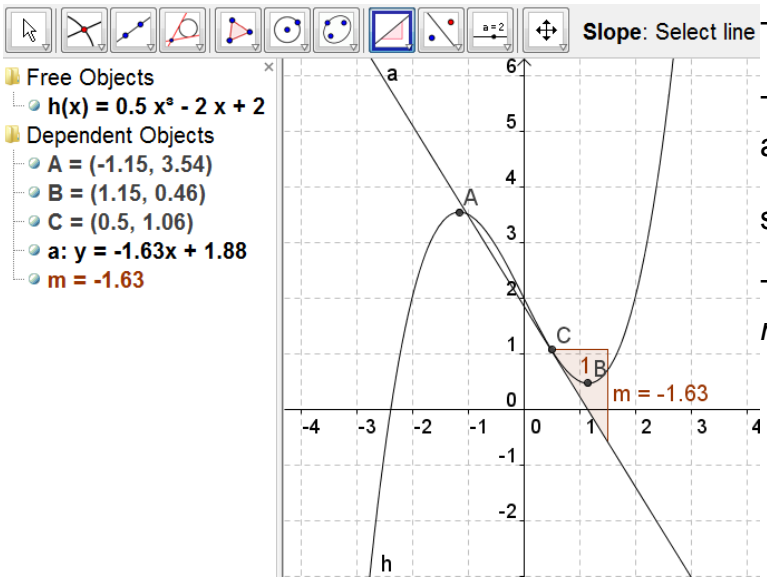
We will find the gradient of the function *h* when *x* = 0,5. First we draw a tangent line in that point. Then we find its slope.



Define the point C using the point tool  or the command C=(0.5,h(0.5)).



Then we use the tool Tangents  to draw the tangent line in C.



The tangent line is $y = -1{,}63\,x + 1{,}88$

Therefore, the slope is -1,63 We can also find the slope by using the tool slope 

The picture shows that the slope is *m* = -1,63