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JSXGraph: To Numbas and beyond

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What is JSXGraph

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What is JSXGraph?

- A JavaScript library developed at Bayreuth University
- A way of producing interactive graphics in web sites and Numbas
- Freely available under Creative Commons licence
- Has an active user community and is well documented
- Includes it's own scripting language, "JessieCode"

JSXGraph within Numbas

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JSXGraph within Numbas.

- Minimises reliance on external systems to generate the interactive elements
- Integrates with Numbas variables and marking algorithm
- Faster rendering than extensions relying on external servers
- Can be integrated with TikZ and other LaTeX graphics packages

Demo 1

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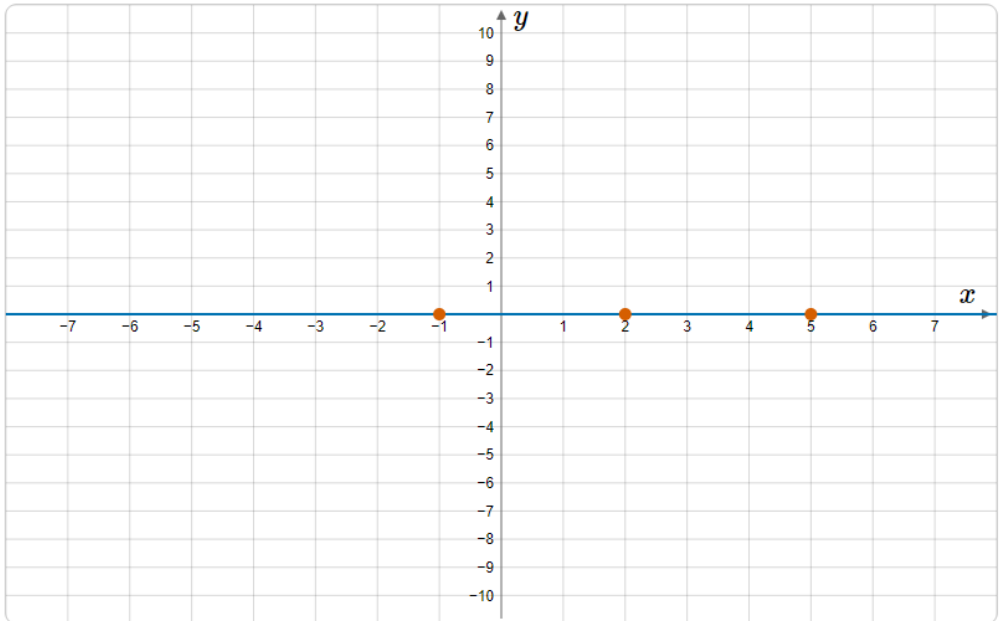
Basic example

Plot points



Move the points in the number plane above to the points you calculated in the previous part of the question.

- incorporates user's input in marking algorithm

Demo 2

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Using variables in JSXGraph elements

```
jessiecode(800,500,[-450,{a}+0.5,450,-{a}-0.5],"""
yaxis = axis( [0,0],[0,1] ) <<
  ticks: <<
    ticksdistance: 0.5,
    insertticks: false
  >>,
  withLabel: true,
  name: '$f(\\\\theta)$',
  useMathjax: true,
  label: <<position: 'urt', fontSize: 20, offset: [10,-10]>>
>>;

xaxis = axis( [0,0],[1,0] ) <<
  ticks: <<
    ticksdistance: 90,
    insertticks: false
  >>,
  withLabel: true,
  name: '$\\\\theta$',
  useMathjax: true,
  label: <<position: 'urt', fontSize: 20, offset: [-10,10]>>
>>;

functiongraph('{function}', -450, 450) <<highlight: false, strokeWidth: 2>>;
  """,
[
    "axis": false
])
```

```
jessiecode(500,{axesV},[{left},{top},{right},{bottom}],
"aLabel={aLabel};bLabel={bLabel};cLabel={cLabel};ab={ab};bc={bc};XCoordOfRA=
{XCoordOfRA};YCoordOfRA={YCoordOfRA};hSMPX={horizontalSideMidpointX};hSMPY=
{horizontalSideMidpointY};vSMPX={verticalSideMidpointX};vSMPY={verticalSideMidpointY};hypMPX=
{hypotenuseMidpointX};hypMPY={hypotenuseMidpointY};hAHP0=
{horizontalAngleHorizontalPoint[0]};hAHP1={horizontalAngleHorizontalPoint[1]};hAVP0=
{horizontalAngleVerticalPoint[0]};hAVP1={horizontalAngleVerticalPoint[1]};horizontalLabelPosition=
{horizontalLabelPosition};verticalLabelPosition={verticalLabelPosition};hypotenuseLabelPositionX=
{hypotenuseLabelPositionX};hypotenuseLabelPositionY={hypotenuseLabelPositionY};"+safe(""" //
[l,t,r,b]
  point(0,0) <<id:'A', fixed: true, snapToGrid: false, withLabel: false, showInfobox: false, size:
0>>;
  point(ab,0) <<id:'B', fixed: true, snapToGrid: false, withLabel: false, showInfobox: false,
size: 0>>;

hAngle = function() {if (ab>0) {
    if (bc>0) {
      return angle(B,A,C) <<name:'x', type:'sector', orthoType:'square', withLabel: true, label:
<<offset: [10,0], fontSize: 20, color: 'black'>>>>;
    } else {
```

- Use of variable values in JessieCode – with and without safe mode
- Uses Numbas variables in graphic

Demo 3

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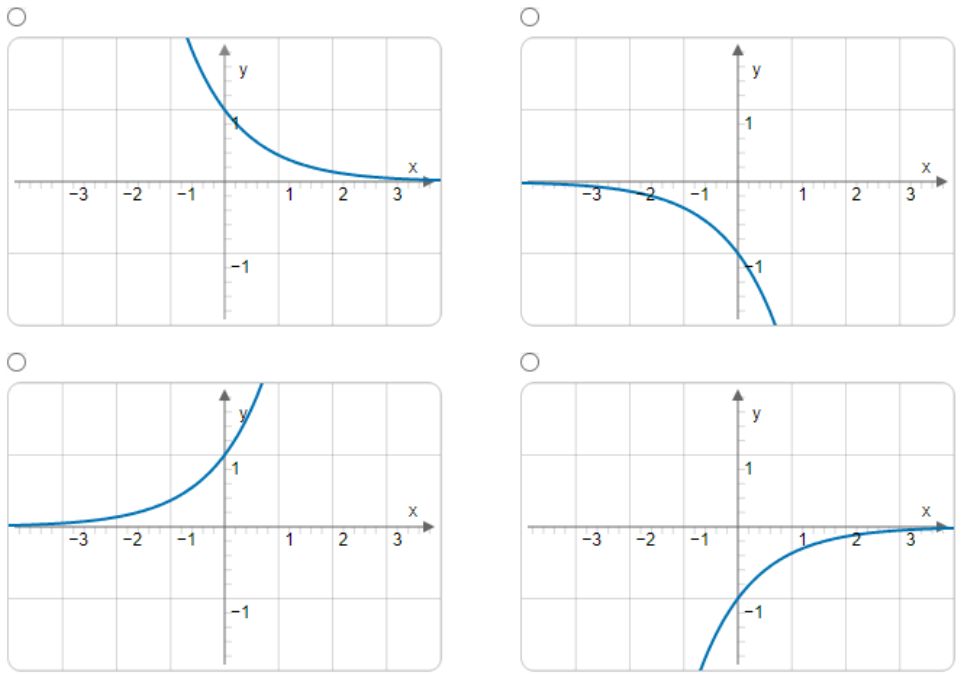
Use JSXG as multiple choice options

Which of the following is the graph of $y = -e^{-x}$?



- JSXGraphics created as functions not Numbas variables

Demo 4

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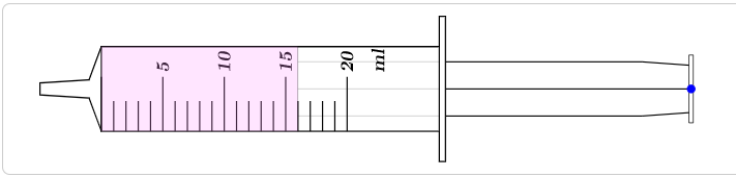
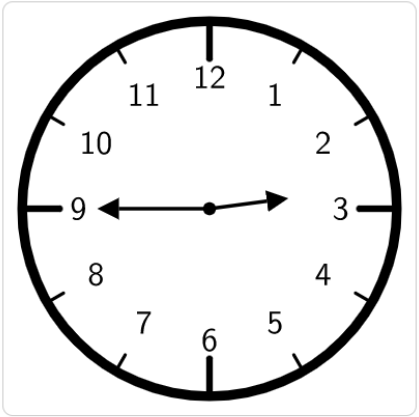
TikZ and JSXGraph



You are due to attend a meeting at 1530. As you enter the building you notice the clock below (note that it is afternoon)



By how many hours and minutes are you early or late for the meeting?

You are _____ hours and _____ minutes [ ] for the meeting.

- Use LaTeX+TikZ to generate svgs, embedded in Numbas and coordinate systems can be synched
- Static complex graphics as svg not generated by JSXGraph

Demo 5

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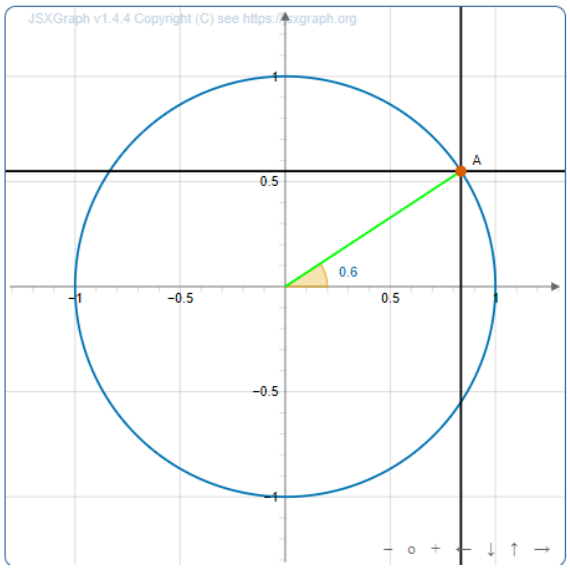
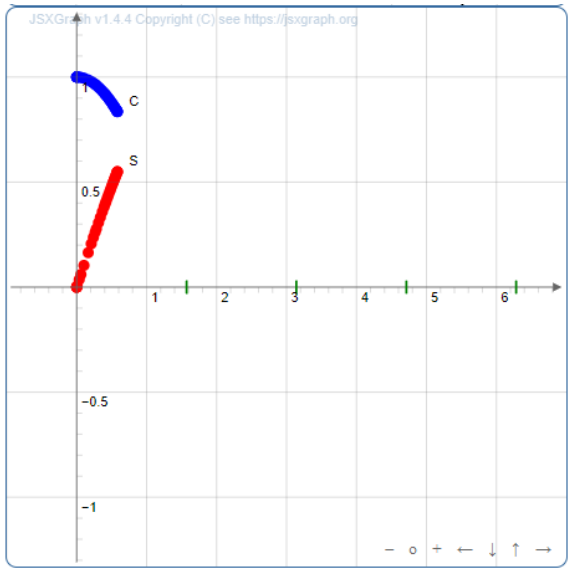
JSXGraph in web page





- JSXGraph object embedded in web page via iFrame
- Interactivity across two boards

Thank you

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Questions?