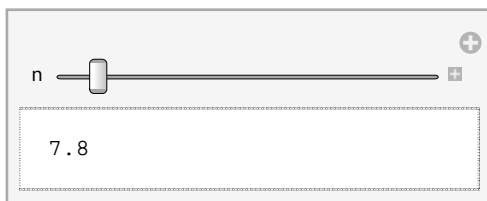# 8

ANIMATION OF GRAPHS

8.1. Manipulate

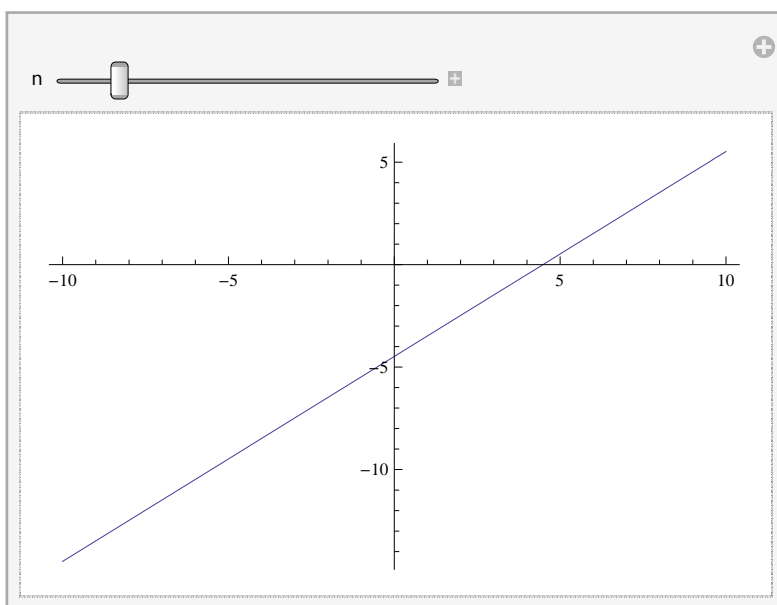### ▼ Basic command: Manipulate[expression, {u, umin, umax}],]

This command is to create the animation of graphs, by changing the value of a parameter that can be controlled interactively.

★ Using parameters

```
Clear["Global`*"]
Manipulate[n, {n, 1, 100}]
```
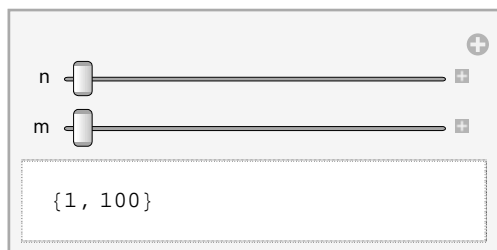
```
n  ═╾□══════════════════════  ⊞

        7.8
```

```
Manipulate[Plot[x + n, {x, -10, 10}], {n, -6, 6}]
```

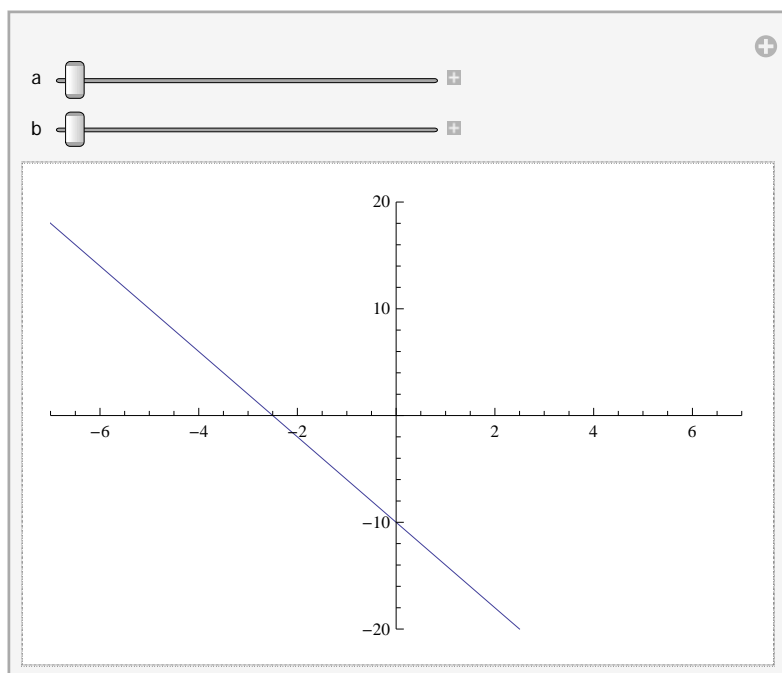E. Alberdi Celaya
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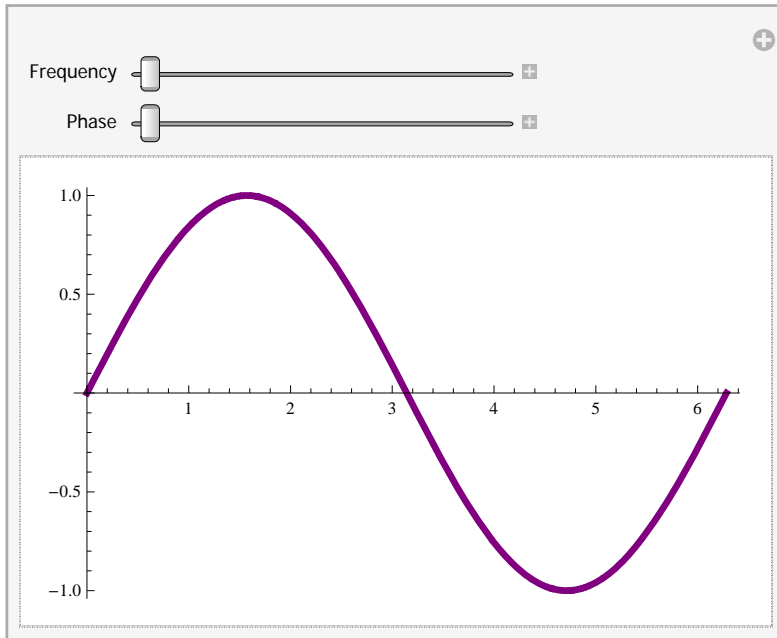## ★ Using more than one parameter

```
Manipulate[{n, m}, {n, 1, 100}, {m, 100, 1}]
```



```
Manipulate[Plot[a * x + b, {x, -10, 10}, PlotRange → {{-7, 7}, {-20, 20}}],
 {a, -4, 4}, {b, -10, 10}]
```

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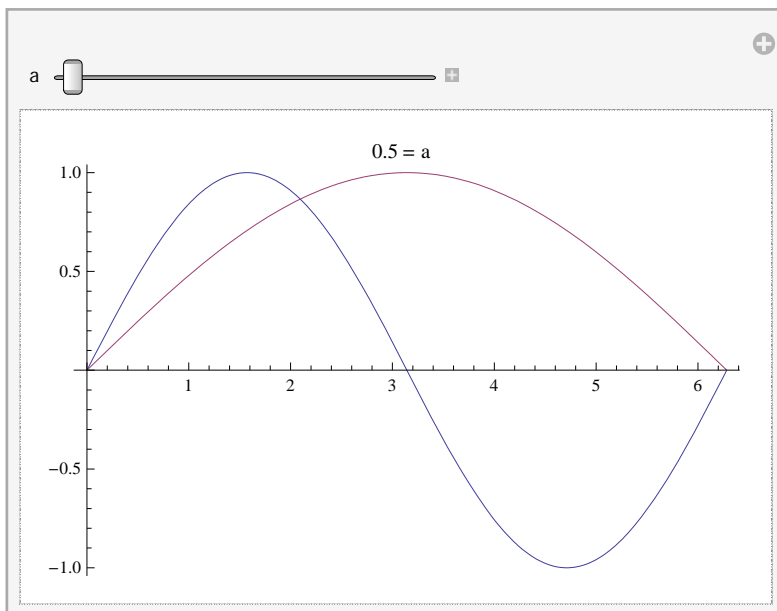
▼ Some options of the command Manipulate[ ]

★ Control bars

```
Manipulate[Plot[{Sin[x], Sin[a + b x]}, {x, 0, 2 Pi},
  PlotStyle → {{Blue, Dashing[0.02]}, {Purple, Thickness[0.01]}}],
 {{b, 1, "Frequency"}, 1, 10}, {{a, 0, "Phase"}, 0, 2 Pi}]
```
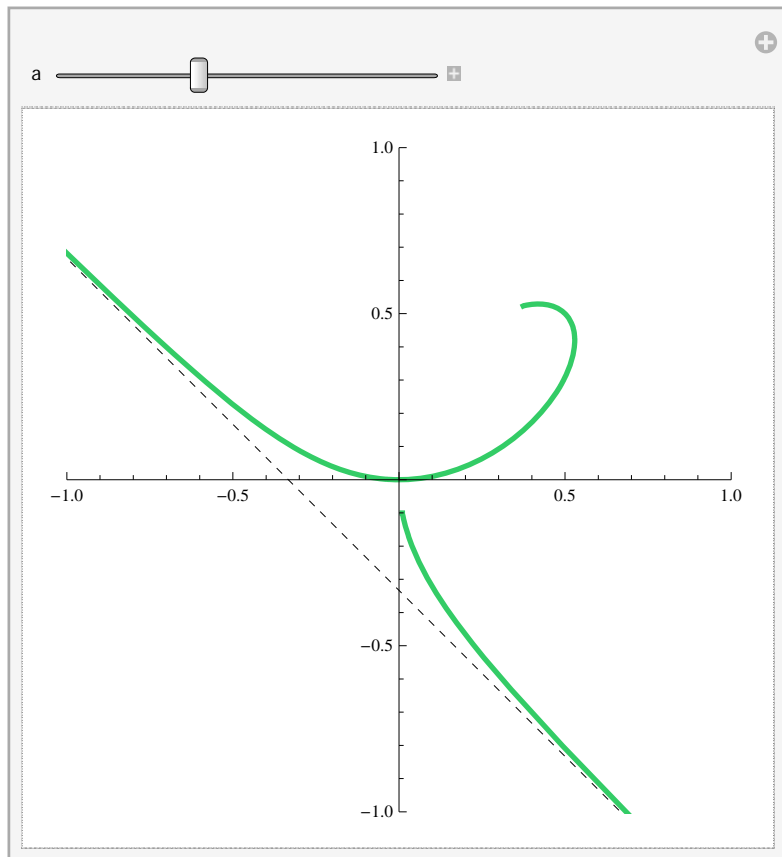

★ Options of the command Plot[]: labels, domain

```
Manipulate[Plot[{Sin[x], Sin[a x]}, {x, 0, 6.28}, PlotLabel → a "= a  "], {a, 0.5, 2}]
```
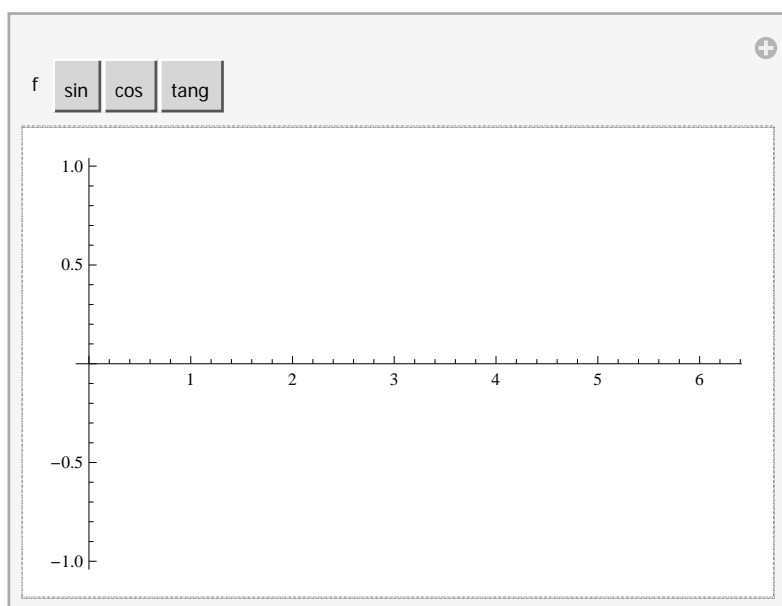
★ **Manipulating the domain of a curve given in parametric coordinates**

$$\text{Manipulate}\left[\text{ParametricPlot}\left[\left\{\frac{t}{1+t^3}, \frac{t^2}{1+t^3}\right\}, \{t, -10, a\}, \text{ExclusionsStyle} \to \text{Dashed},\right.\right.$$

$$\text{Exclusions} \to \left\{1+t^3 == 0\right\}, \text{PlotStyle} \to \{\text{RGBColor}[0.2, 0.8, 0.4], \text{Thickness}[0.008]\},$$

$$\left.\left.\text{PlotRange} \to \{\{-1, 1\}, \{-1, 1\}\}\right], \{a, -3.4, 10, 0.05\}\right]$$
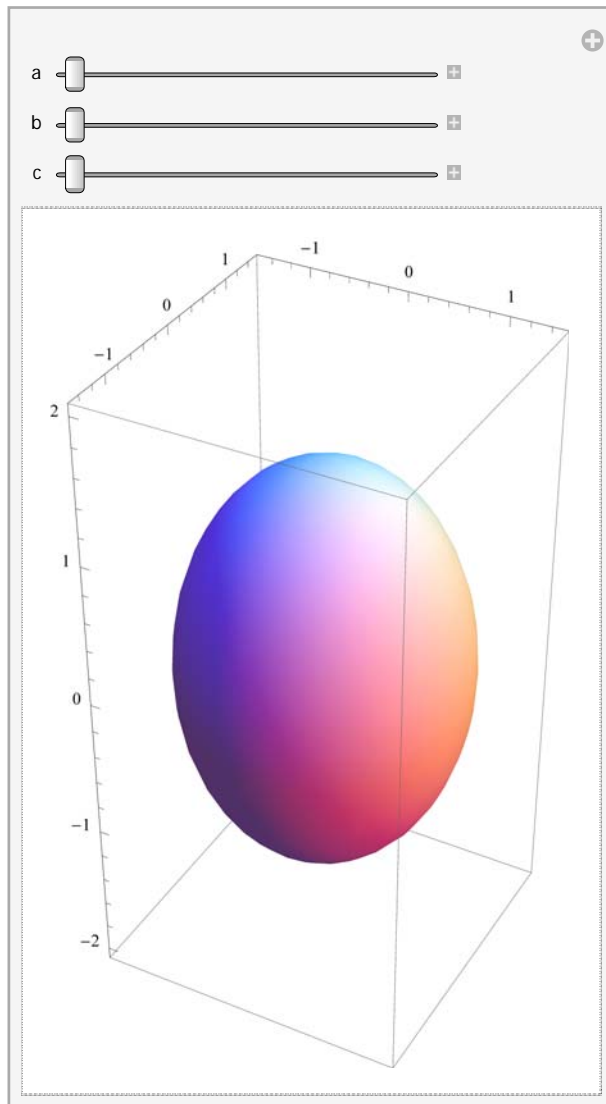

★ **Making the graphic representation of various functions by using the control buttons**

$$\text{Manipulate[Plot[f[x], \{x, 0, 2\,Pi\}], \{f, \{Sin \to "sin", Cos \to "cos", Tan \to "tang"\}\}]}$$

★ **Animation of 3D graphs**

```
Manipulate[ContourPlot3D[a * x^2 + b * y^2 + c * z^2 == 1, {x, -1.5, 1.5}, {y, -1.5, 1.5},
   {z, -2, 2}, BoxRatios → {1, 1, 2}, Mesh → None], {a, 0.5, 4}, {b, 0.5, 4}, {c, 0.5, 4}]
```
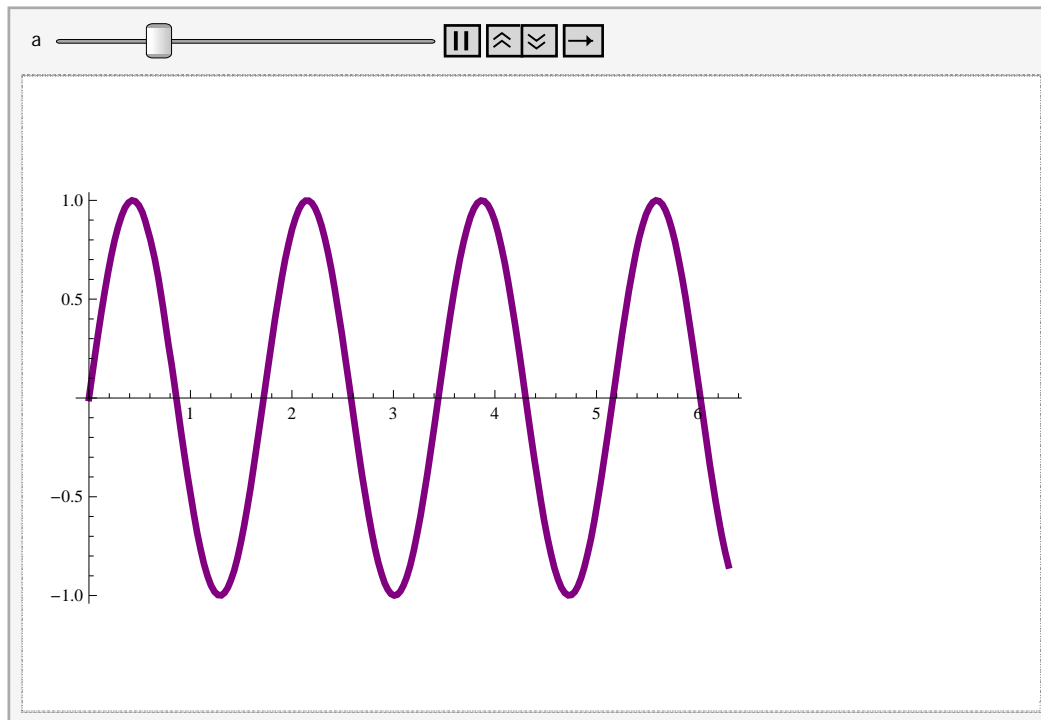

8.2. Animate

▼ Basic command: Animate[expression, {u, umin, umax}],]

This command is to create the animation of graphs, by changing the value of a parameter that can be controlled interactively. It works in a similar way as the command Manipulate.
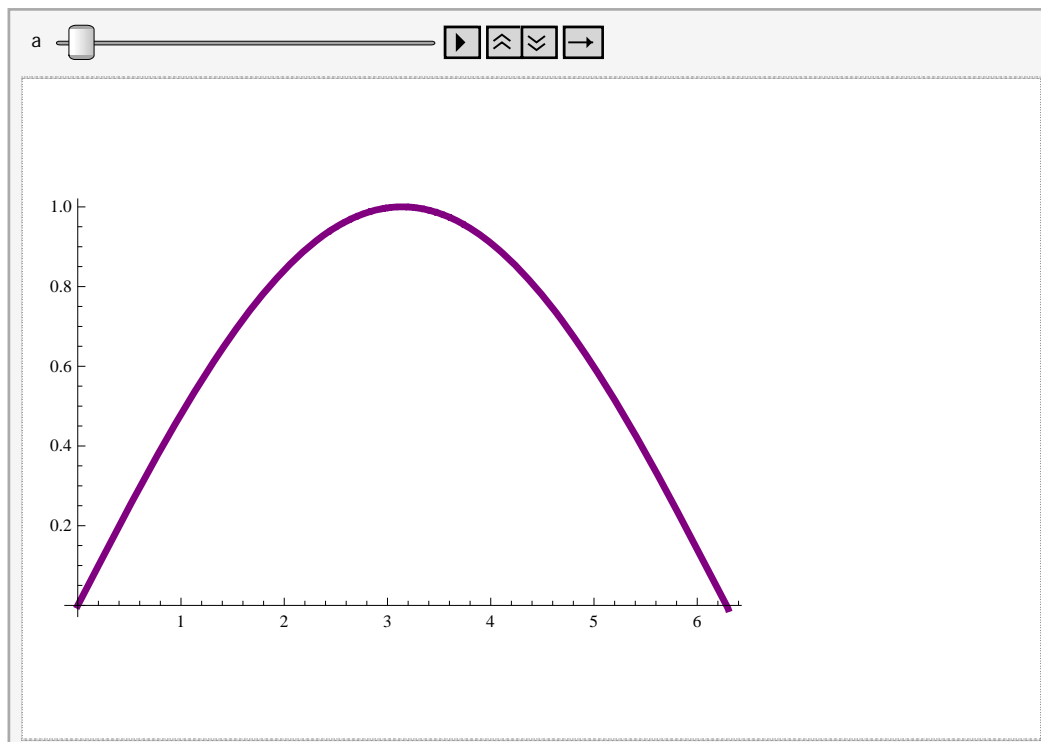
```
Animate[Plot[Sin[a * x], {x, 0, 6.3}, PlotStyle → {Purple, Thickness[0.01]}], {a, 1, 10}]
```


▼ Some options of the command Animate[ ]

★ **AnimationRunning→ False: With this option the animations starts from pause position**

```
Animate[Plot[Sin[a * x], {x, 0, 6.3}, PlotStyle → {Purple, Thickness[0.01]}],
  {a, 0.5, 5}, AnimationRunning → False]
```


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★ Position of the controls: Left, Right, Top, Bottom

```
Animate[Plot[Sin[a * x], {x, 0, 6.3}, PlotStyle → {Purple, Thickness[0.01]}],
 {a, 0.5, 5}, AnimationRunning → False, ControlPlacement → Bottom]
```

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