

Dinamične aplikacije

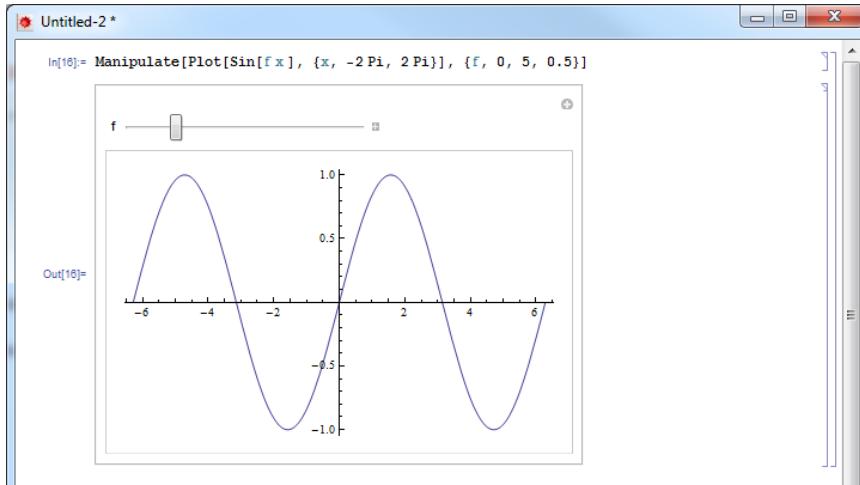
V Mathematici

$$a \sin(f x + w)$$

- Narišimo najprej funkcijo $\sin(x)$ na intervalu $[-2\pi, 2\pi]$
- Plot[$\text{Sin}[x]$, { x , -2Pi, 2Pi}]
- Kaj pa
 - Plot[$\text{Sin}[f x]$, { x , -2Pi, 2Pi}]
- Aha, f mora imeti neko vrednost
 - $f := 2$
- Kako bi f spremenjali interaktivno
 - Npr. z drsnikom

Manipulate

- `Manipulate[Plot[Sin[f x], {x, -2 Pi, 2 Pi}], {f, 0, 5, 0.5}]`



- Razlaga dela s to dinamiko
 - Skrijemo definicijo
 - Klik na + v krogu in kvadratku

CDF

- Computable document
- Možnost prikaza z brezplačnim prikazovalnikom (Mathematica Reader)
 - <http://www.wolfram.com/products/player/>
- Možnost vključitve v spletne strani
 - Deploy
 - Prikaz v brskalniku

Wolfram Demonstration Projects

- Prikaz, kaj vse se da narediti (tudi) z Manipulate
- <http://demonstrations.wolfram.com/index.html>

Različne možnosti

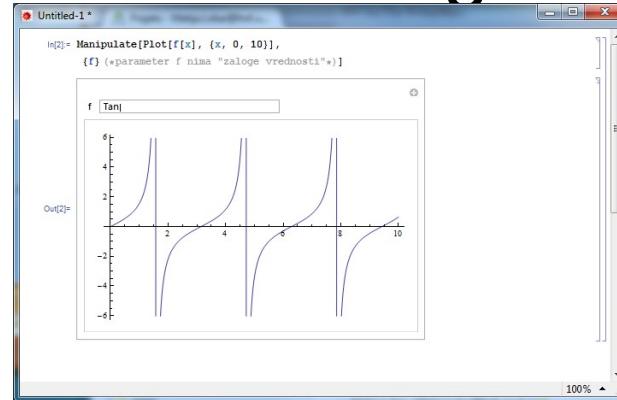
- Več drsnikov
 - `Manipulate[Plot[Sin[f x + w], {x, -a Pi,a Pi}], {f, 0, 5, 0.5}, {a, -5, 5, 1},{w, -2, 2}]`
- Avtomatsko spreminjanje večih "hkrati"
- Določanje začetne vrednosti
 - `Manipulate[Plot[Sin[f x + w], {x,-a Pi,a Pi}], {{f, 2.5}, 0, 5, 0.5}, {a, -5, 5, 1},{w, -2, 2}]`
 - **f ima za začetno vrednost 2.5**
- Način izbire vrednosti se prilagaja uporabi
 - "**Barvanje grafa**"
 - `Plot[Sin[x], {x, -Pi, Pi}, PlotStyle -> Red]`
 - **Izbirnik za barvo**
 - `Manipulate[Plot[Sin[10 x]+Sin[f x+q],{x,0,2 p}, PlotStyle -> color],{f,10,20},{q,0,p},{color,Blue}]`

Manipulate

- **Manipulate[izraz, {p, pmin, pmax}]**
 - Omogoča, da parameter p v izrazu zavzame vrednosti med pmin in pmax. Na začetku je pmin.
- **Manipulate[izraz, {p, pmin, pmax, korak}]**
 - Omogoča, da parameter p v izrazu zavzame vrednosti med pmin in pmax s korakom korak
- **Manipulate[izraz, {{p, pzac}, pmin, pmax, ...}]**
 - Omogoča, da parameter p v izrazu zavzame vrednosti med pmin in pmax . Na začetku je pzac.
- **Manipulate[izraz, {p, {p1, p2, ..., pn}}]**
 - Omogoča, da parameter p v izrazu zavzame vrednosti p1, p2, .. ali pn
- **Manipulate[izraz, {p, ...}, {q, ...}]**
 - Omogoča, da v izrazu določamo vrednosti parametrov p in q.

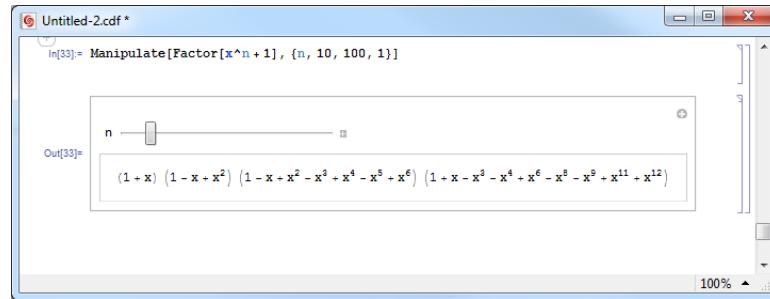
Parameter brez vrednosti

- Narišimo "poljubno" funkcijo
- Izrabimo, da kot velja pri Pythonu, je tudi tu ime funkcije "spremenljivka"
- Manipulate [
 $\text{Plot}[f[x], \{x, 0, 10\}]$,
 $\{f\}$ (* parameter f nima "zaloge
vrednosti" *)]
]



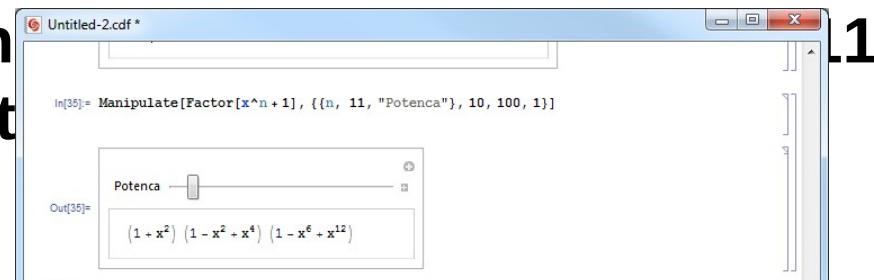
Ne le za risanje

- **Manipulate[Factor[x^n+1],{n,10,100,1}]**



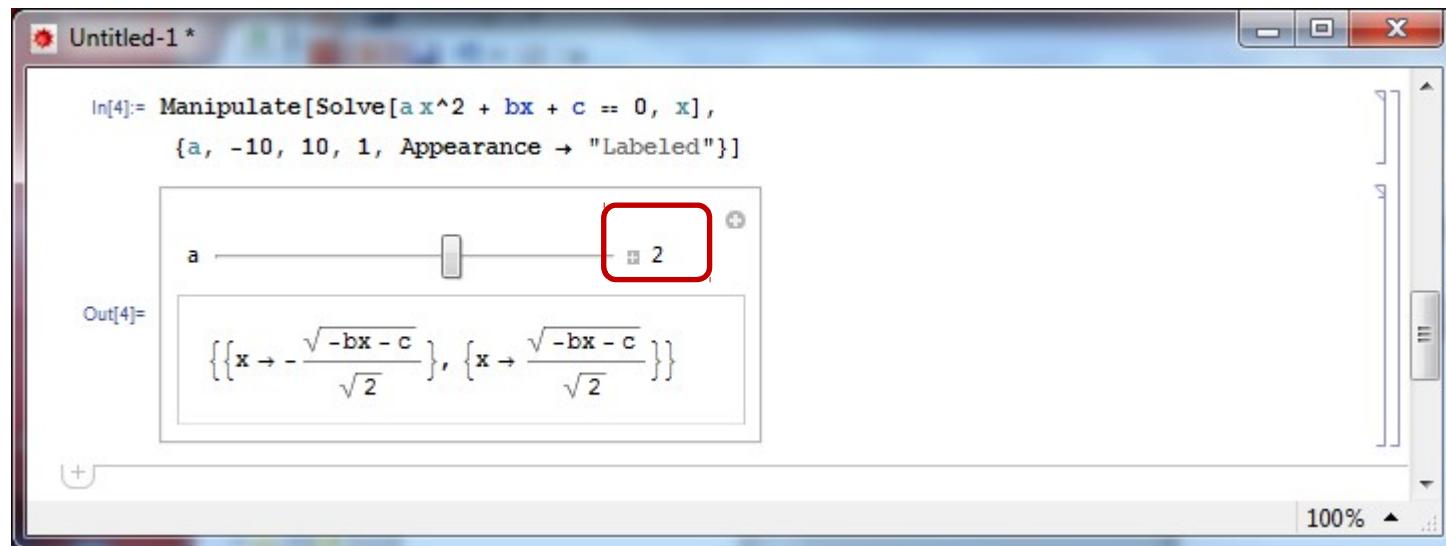
- **Poimenovanje**

- Manipulate[Factor[x^n+1],{n,11,"potencia"},10,100,1], "potencia"



Appearance -> "Labeled"

- Dobimo vrednost parametra



Lastne vrednosti

Untitled-2.cdf *

```
In[52]:= MatrixForm[{{a, b}, {1, c}}]

Out[52]//MatrixForm=

$$\begin{pmatrix} a & b \\ 1 & c \end{pmatrix}$$

```

+ In[50]:= Manipulate[Eigenvalues[{{a, b}, {1, c}}], {a, -2, 2}, {b, -2, 2}, {c, -2, 2}]

Out[50]=

```
{-0.81 + 0.381969 i, -0.81 - 0.381969 i}
```

Untitled-2.cdf *

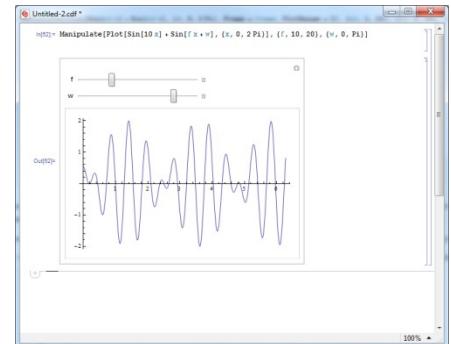
```
In[61]:= Manipulate[Eigenvalues[{{a, b}, {1, c}}], {a, {-2, 1, 2}}, {b, {-2, -1, 0, 1, 2, 3, 4, 5}}, {c, {-2, 2}}, ControlType -> Manipulator]
```

Out[61]=

```
{-2 + i \sqrt{2}, -2 - i \sqrt{2}}
```

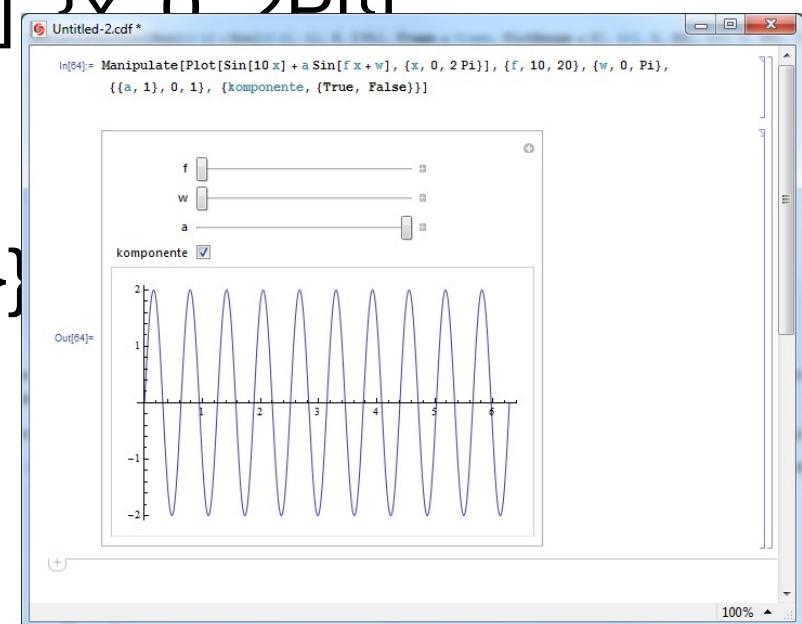
Še en zgled – interferenca signalov

- $\sin(10x) + \sin(11x)$
- Plot na $[0, 2\pi]$
- Kaj pa: $\sin(10x) + \sin(f x + w)$
 - Osnovni signal $\sin(10x)$ "motimo" s podobnim signalom s fazo f in zamikom w
- Manipulate[
 $\text{Plot}[\sin[10x] + \sin[f x + w], \{x, 0, 2\pi\}],$
 $\{f, 10, 20\}, \{w, 0, \pi\}$
]

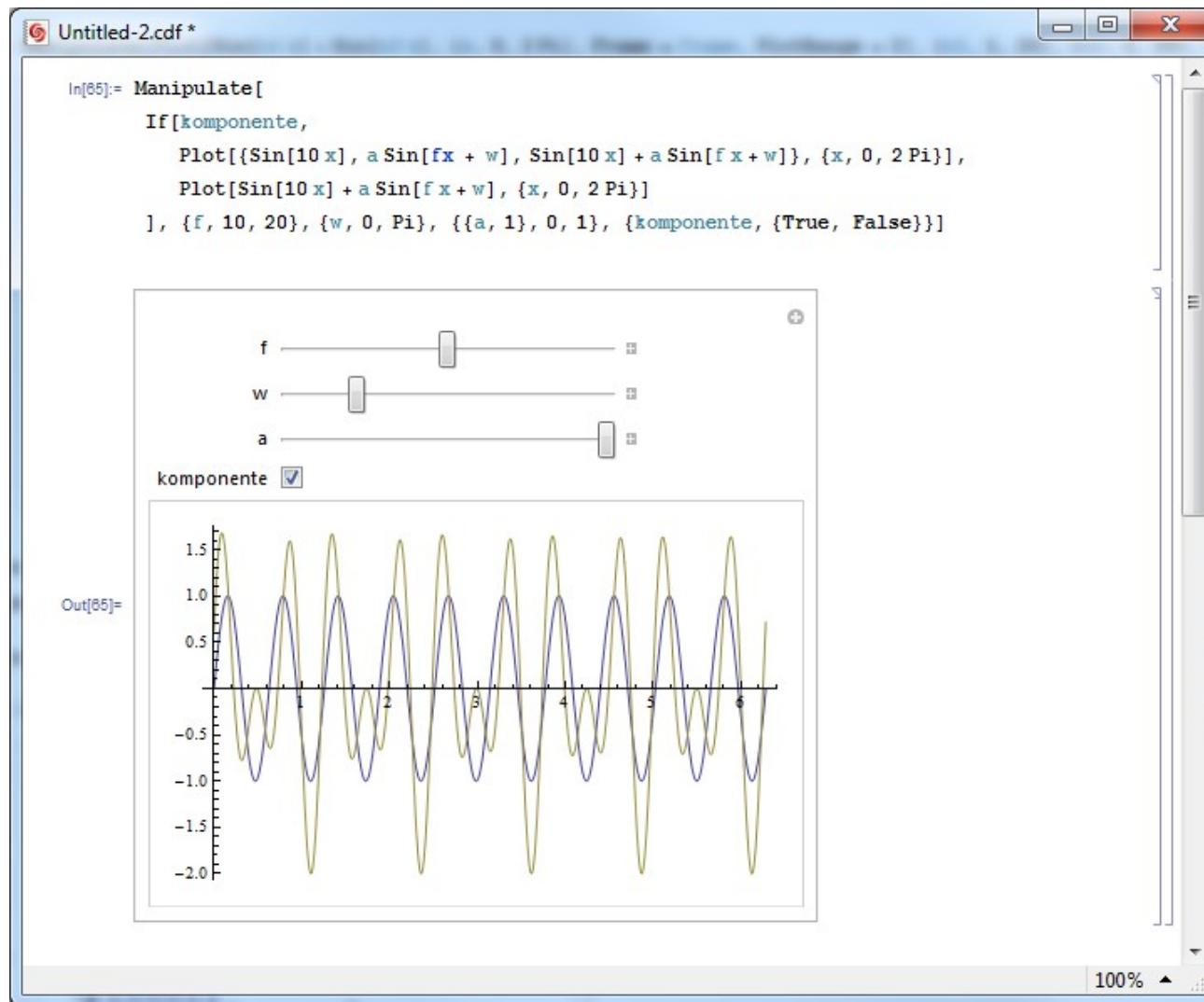


Dodajmo še amplitudo

- ki naj bo med 0 in 1, z začetno vrednostjo 1
- ter možnostjo, da bomo prikazovali tudi osnovne komponente signala
- Manipulate[
 Plot[Sin[10x] + a Sin[f x + w], {x, 0, 2 Pi}],
 {f, 10, 20}, {w, 0, Pi},
 {{a, 1}, 0, 1},
 {komponente, {True, False}}]
]



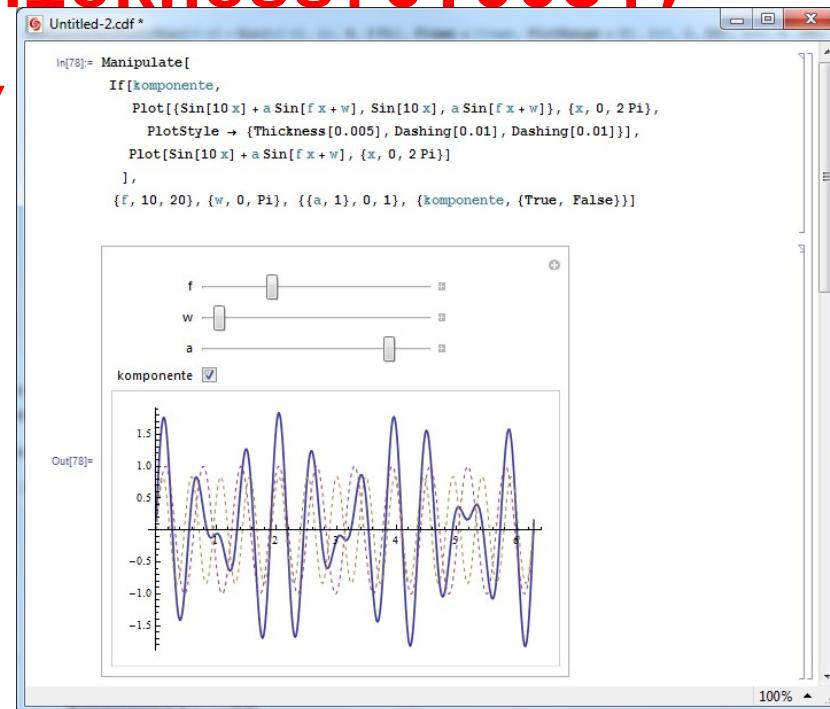
Koda za sestavne dele



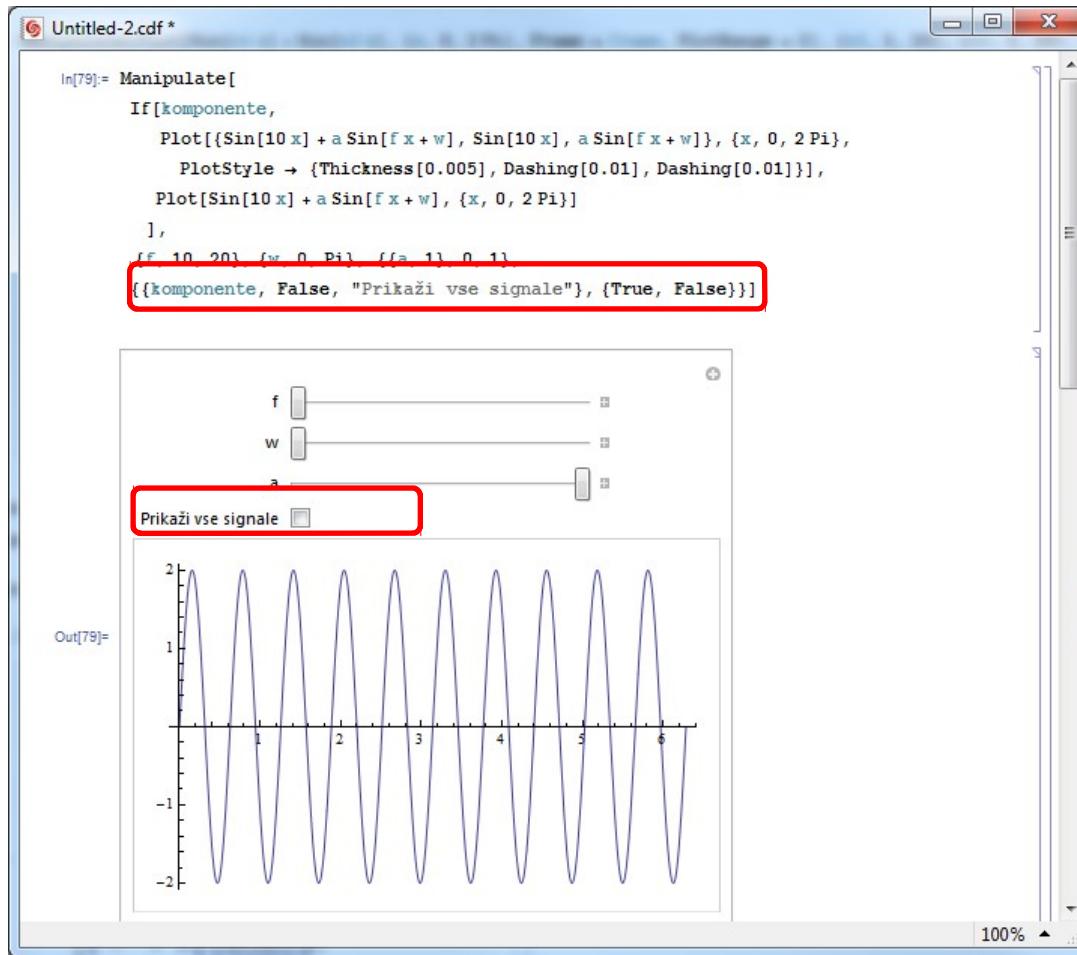
Izboljšajmo videz

- $\text{Plot}[\{\sin[10x], a \sin[f x + w], \sin[10x] + a \sin[f x + w]\}, \{x, 0, 2\pi\},$

**PlotStyle -> {Thickness[0.005],
Dashing[0.01]},**

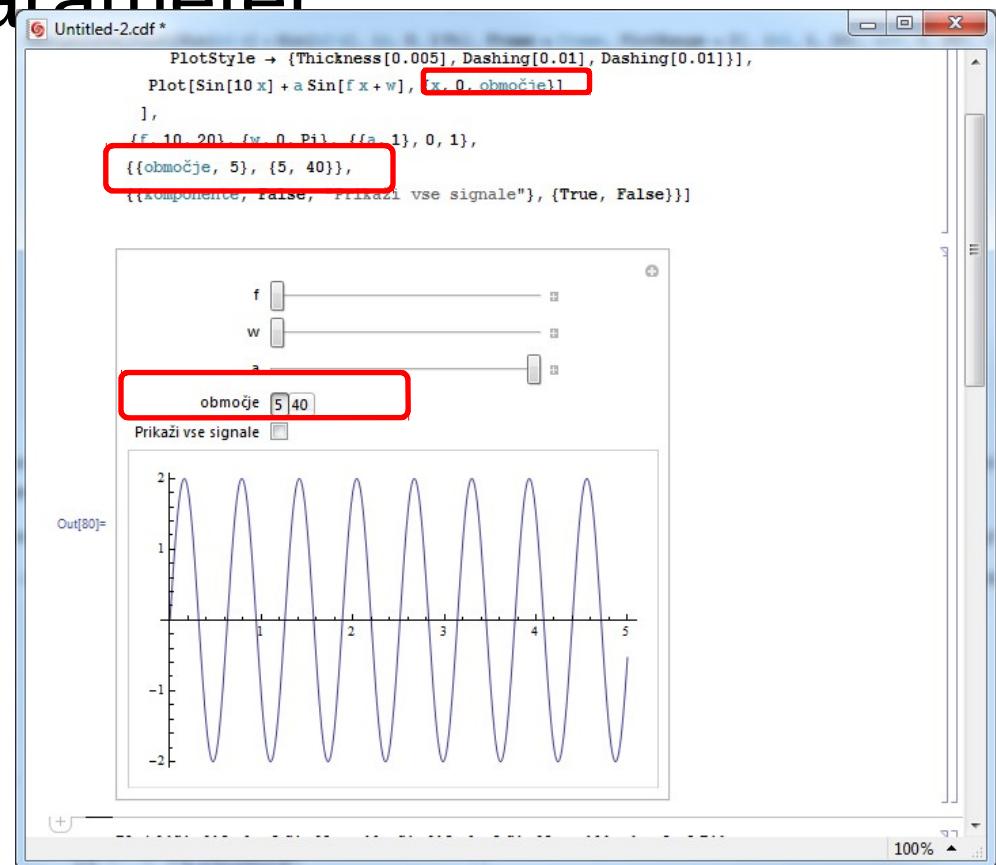


Popravimo še oznako

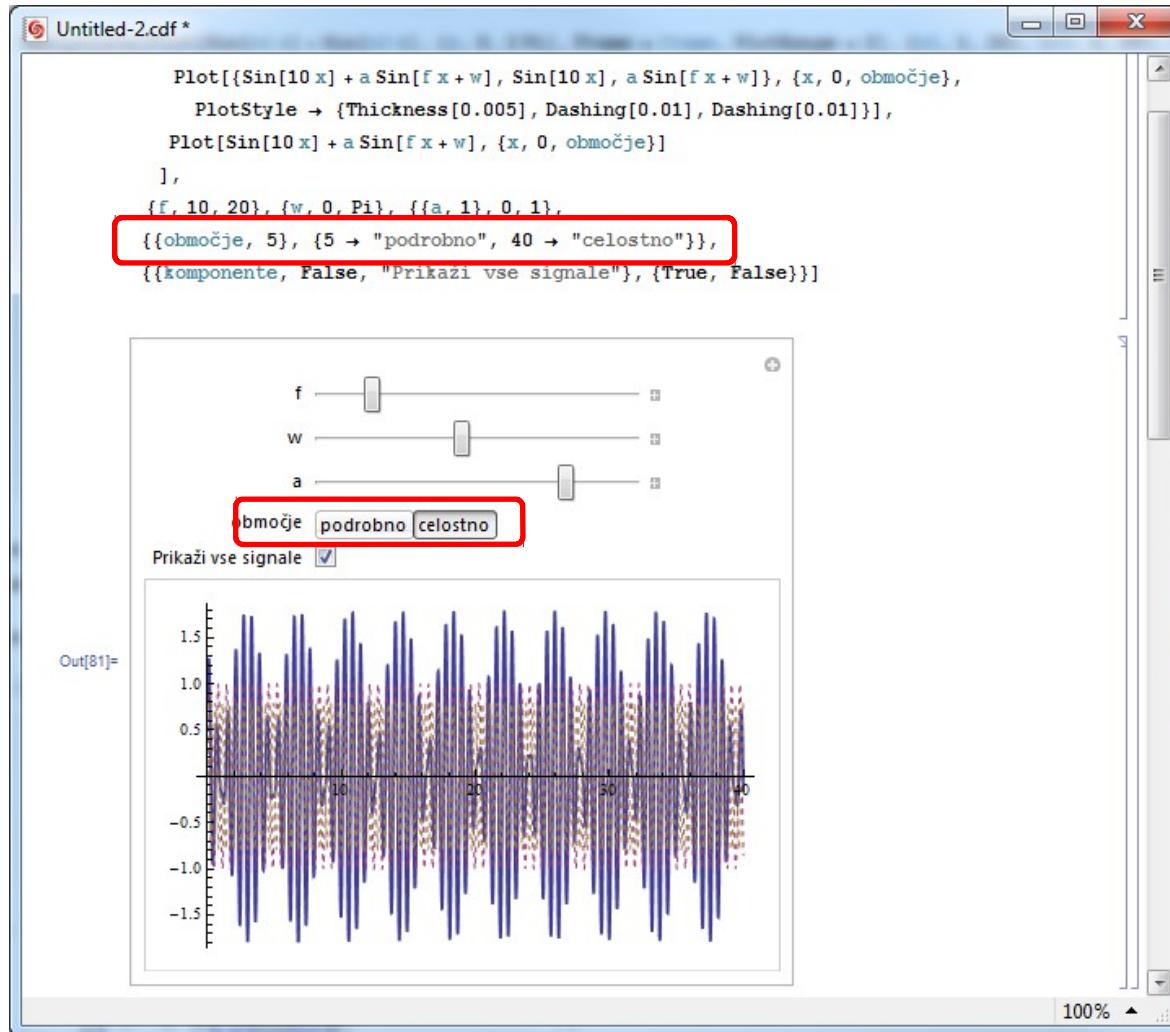


"big picture"

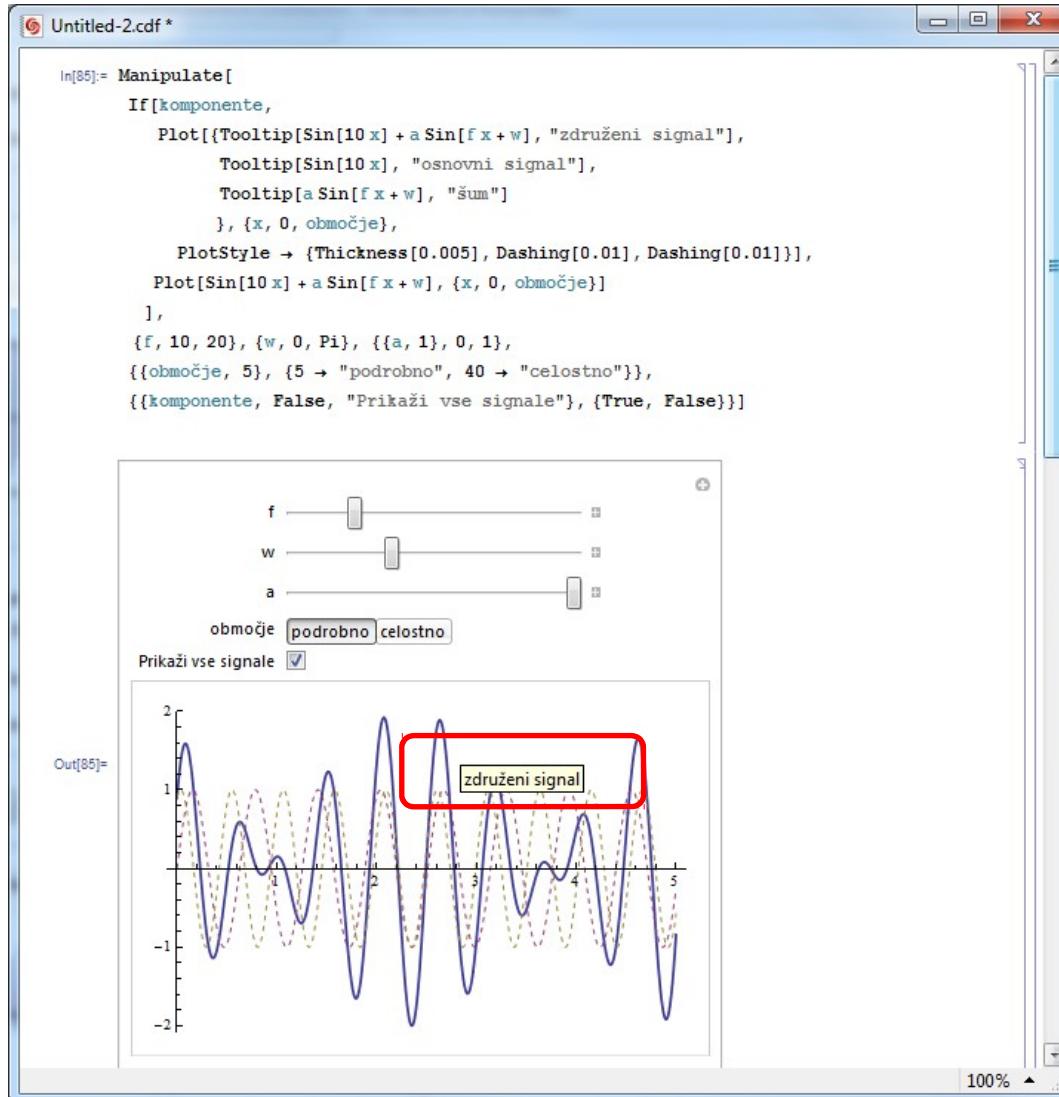
- Kaj pa se dogaja na večjem intervalu?
- Naj bo 2π tudi parameter



A vrednosti na gumbih nas ne zanimajo



Pojasnila k grafom



A možnosti je še veliko

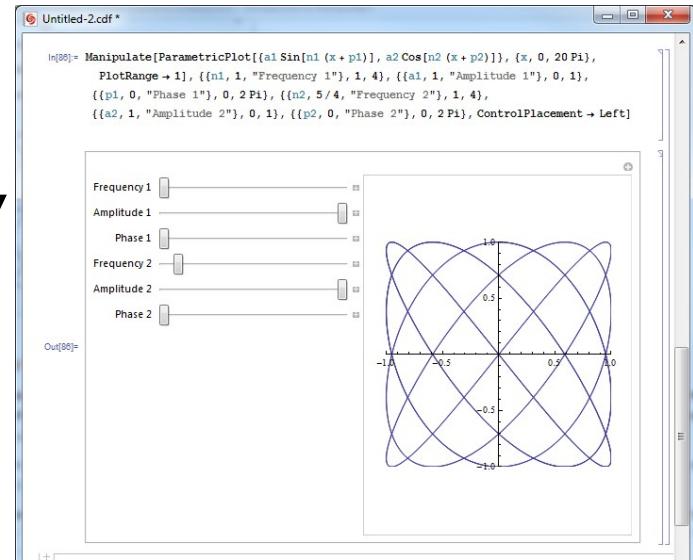
- Več kontrolnikov za isti parameter
- **Manipulate[**
Plot[Sin[n1 x]+Sin[n2 x],{x,0,2Pi},
Filling->filling,PlotRange->2],
{n1,1,20}, {n2,1,20},
{filling,{None,2,1,0.5,0,-0.5,-1,-2}},
{filling,-2,2}]

Vplivanje na položaj

Manipulate[

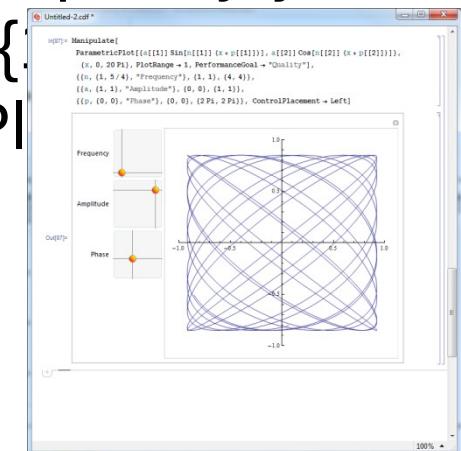
```
ParametricPlot[{a1 Sin[n1 (x+p1)],  
    a2 Cos[n2 (x+p2)]}, {x, 0, 20 Pi},  
    PlotRange -> 1]
```

```
],  
{{n1, 1, "Frequency 1"}, 1, 4},  
{{a1, 1, "Amplitude 1"}, 0, 1},  
{{p1, 0, "Phase 1"}, 0, 2 Pi},  
{{n2, 5/4, "Frequency 2"}, 1, 4},  
{{a2, 1, "Amplitude 2"}, 0, 1},  
{{p2, 0, "Phase 2"}, 0, 2 Pi},  
ControlPlacement -> Left]
```



2D drsniki

- **Manipulate[pt,{pt,{ -1,-1},{1,1}}]**
- Zgled od prej:
 - Parametri seznam z dvema elementoma!
 - ```
Manipulate[ParametricPlot[{a[[1]] Sin[n[[1]] (x+p[[1]])],a[[2]] Cos[n[[2]] (x+p[[2]])]}, {x,0,20Pi},PlotRange->1],{{n,{1,5/4}, "Frequency"},{1,1},{4,4}}, {{a,{1,1}, "Amplitude"},{0,0},{0,0}, "Phase"},{0,0},{2Pi,2Pi}], ControlPlacement->Left]
```



# In še ...

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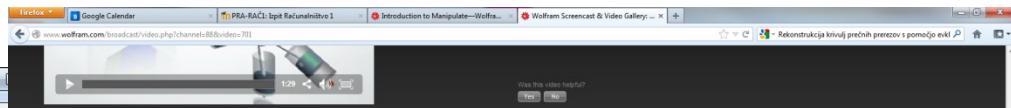
COMPUTABLE DATA

DYNAMIC INTERACTIVITY

- Interactive Manipulation
- Control Objects
- Dynamic Interactivity Language
- New in 8.0 | 7.0 | 6.0
- Viewers & Annotation
- Generalized Input
- Custom Interface Construction

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With Mathematica, you really can build a useful, interactive app in 60 seconds and start exploring your ideas sooner rather than later. Starting with the 60-second app, this course covers the ins and outs of Manipulate, Mathematica's star function for building interactive interfaces. You'll learn techniques for attaching controls to your ideas, making interfaces usable and beautiful, and interactively exploring everything from text and math to graphics and sound.

Level: Intermediate The course is for those who have a basic familiarity with Mathematica.

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