

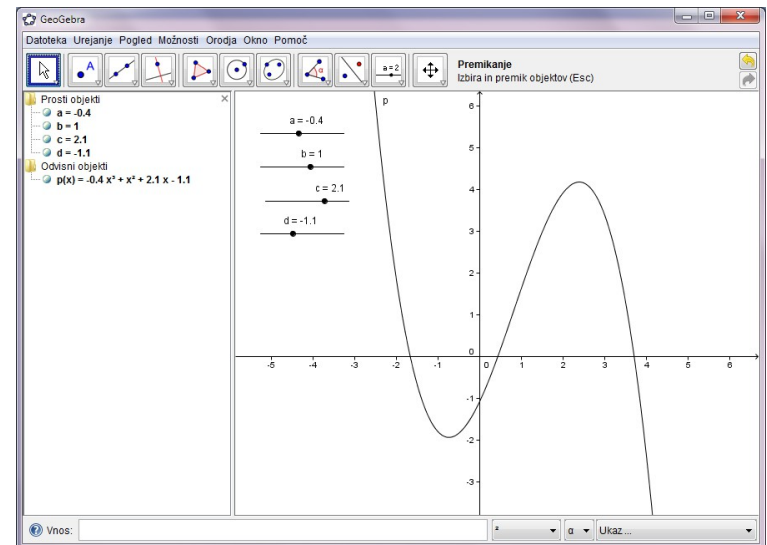
Nekaj analize

Spoznajmo polinom

- Dana je družina kubičnih polinomov $p_{a,b,c,d}(x) = a x^3 + b x^2 + c x + d$
- Zanimajo nas značilne točke tega polinoma:
 - Ničle (realne)
 - Ekstremne točke
 - Prevoji

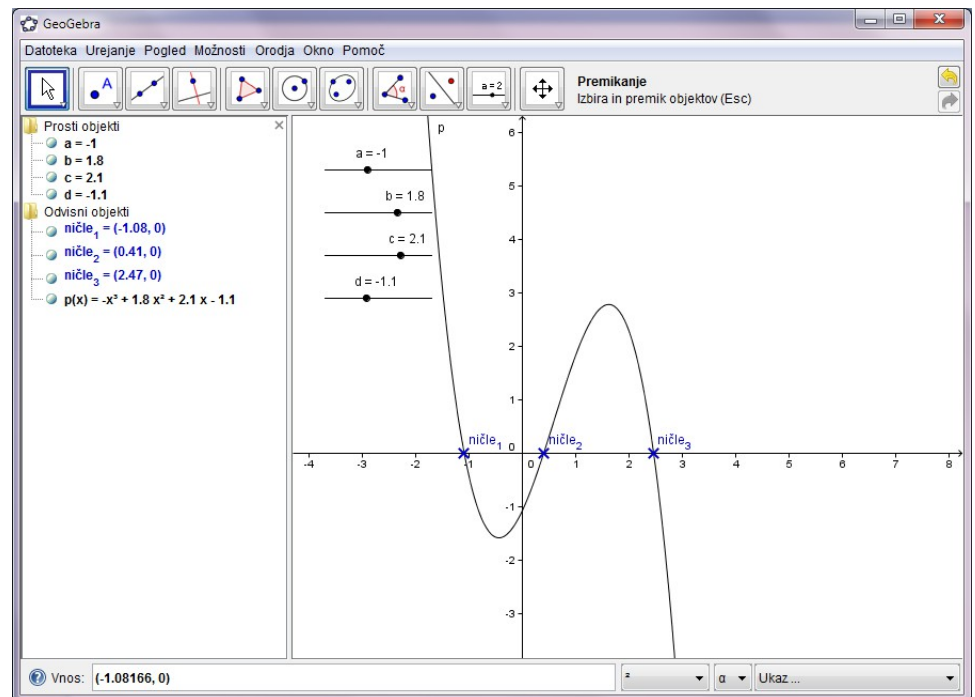
Vnos polinoma

- Vnos polinoma:
- Določimo parametre
- a, b, c, d
- Vnos kot drsnike
- Vnos polinoma
 - $p(x) = a x^3 + b x^2 + c x + d$



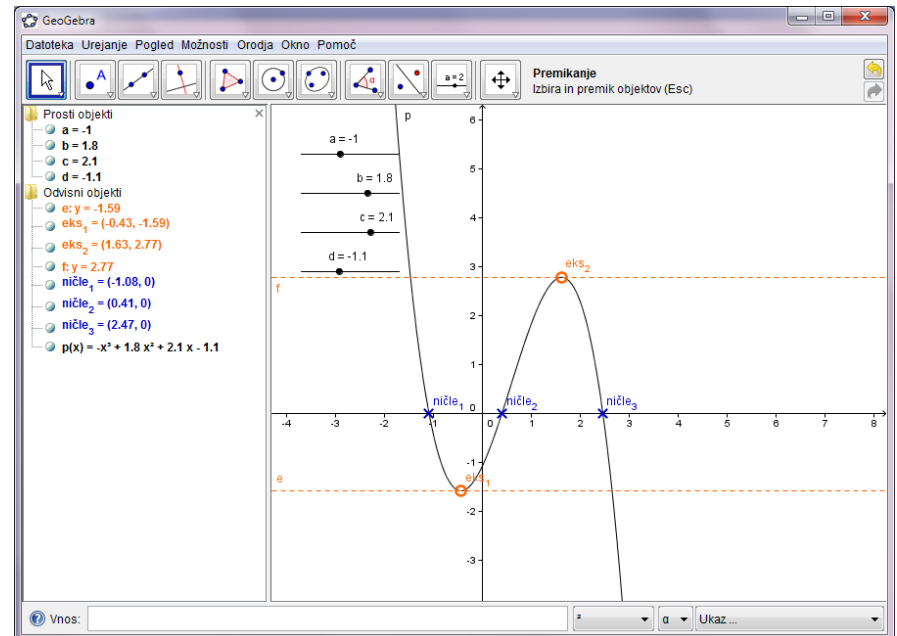
Ničle

- ničle = Root[p]
 - ali po slovensko: ničle = Ničla[p]
 - Dobimo več ničel
 - ki se avtomatsko označijo na sliki
 - in prikažejo v algebrskem oknu



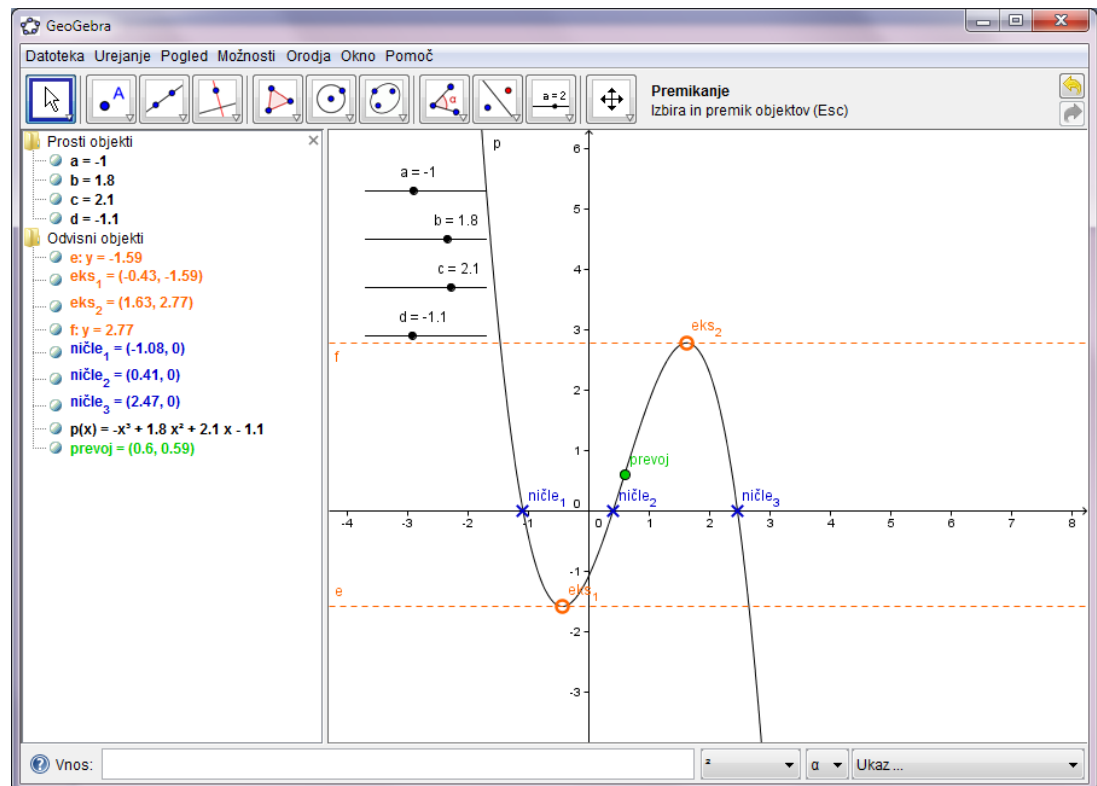
Ekstremne točke

- eks = Extremum[p]
 - Lahko Extremum[p] ali Extremum[p(x)]
 - Slovensko: eks = Ekstrem[p]
 - Minimum/maksimum
 - Označeni točki
- Postavimo še tangenti v ekstremnih točkah in ju naredimo črtnani
 - Tangenta[eks_1, p]



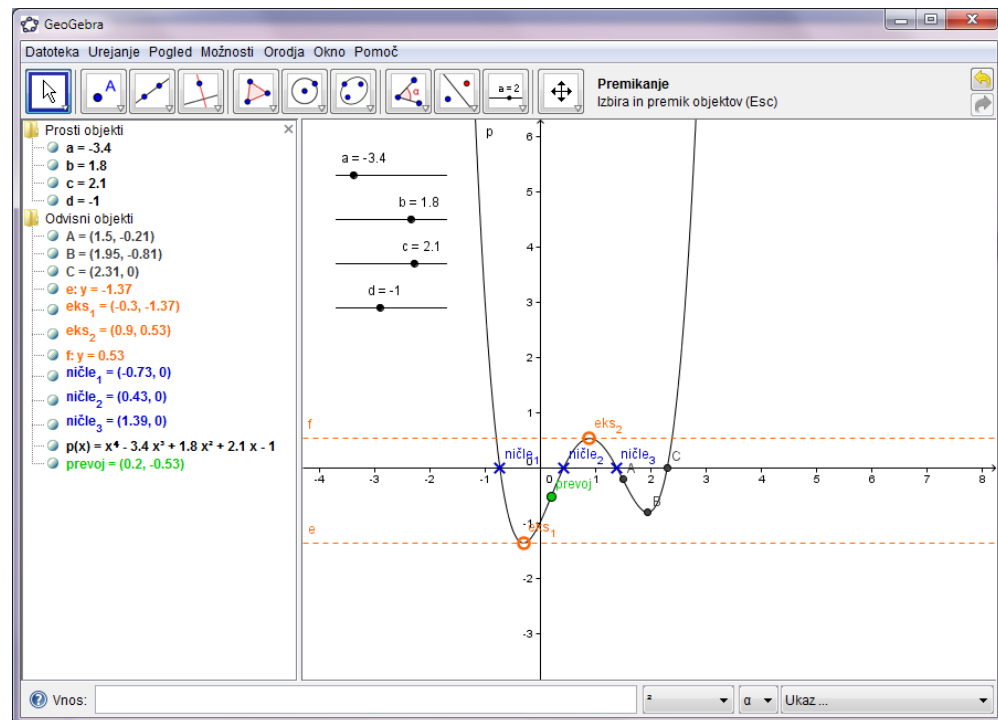
Prevojne točke

- Prevojne točke
 - prevoj = `InflectionPoint[p]`
 - prevoj = `prevojnaTočka[p]`



Pozor ob spremembah

- Denimo, da polinom spremenimo – recimo da dodamo še x^4
- GeoGebra sicer opazi, da smo prej računali ničle, ekstreme in prevoje, a jih poimenuje po svoje



Polinom z določenimi ničlami

- Konstruirajmo kubični polinom, ki ima ničle n_1 , n_2 , n_3
- $p(x) = a(x - n_1)(x - n_2)(x - n_3)$
- Prikaz v "razširjeni obliki"
- Polinom[p(x)]
 - $\text{pol}(x) = \text{Polinom}[2 * (x - 1)(x - 3)]$
 - $\text{pol}(x) = 2x^2 - 6x + 4$
 - Pozor: $\text{Polinom}[a * (x - n_1)(x - n_2)(x - n_3)]$
 - Drugače GeoGebra misli, da je a funkcija (tudi če obstaja število a)

Taylorjeva vrsta

- Potenčna vrsta

$$\sum_{n=0}^{\infty} \frac{f^{(n)}(a)}{n!} (x - a)^n,$$

- Aproksimacija funkcije s polinomom

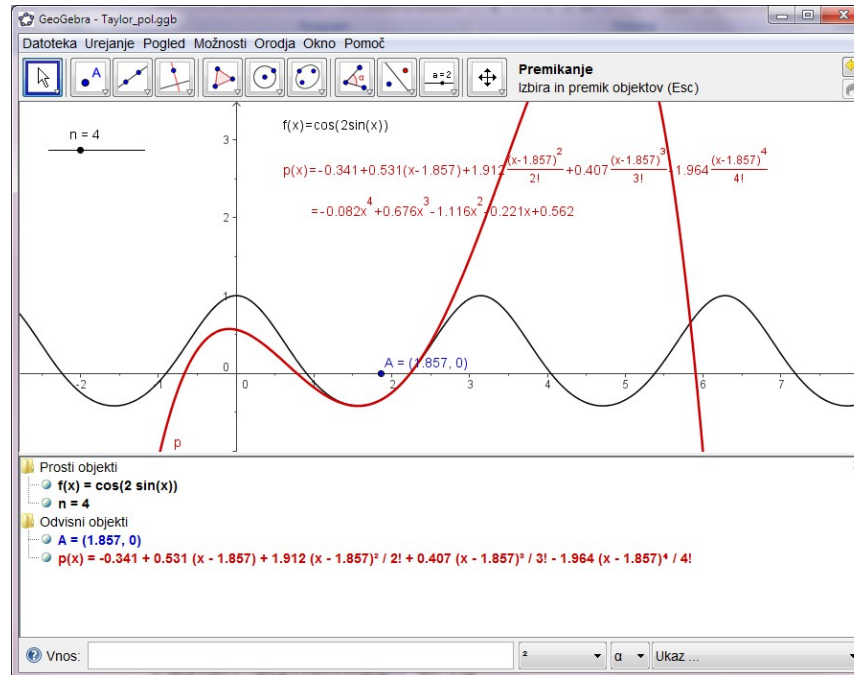
$$f(x) \approx f(a) + f'(a)(x - a) + \frac{f''(a)}{2!}(x - a)^2 + \dots + \frac{f^{(n)}(a)}{n!}(x - a)^n.$$

- Ukaz:

- TaylorjevaVrsta[f, a, n]
- razvoj funkcije f v potenčno vrsto *okrog* točke $x = a$ reda n
- *TaylorPolynomial*[f, a, n]

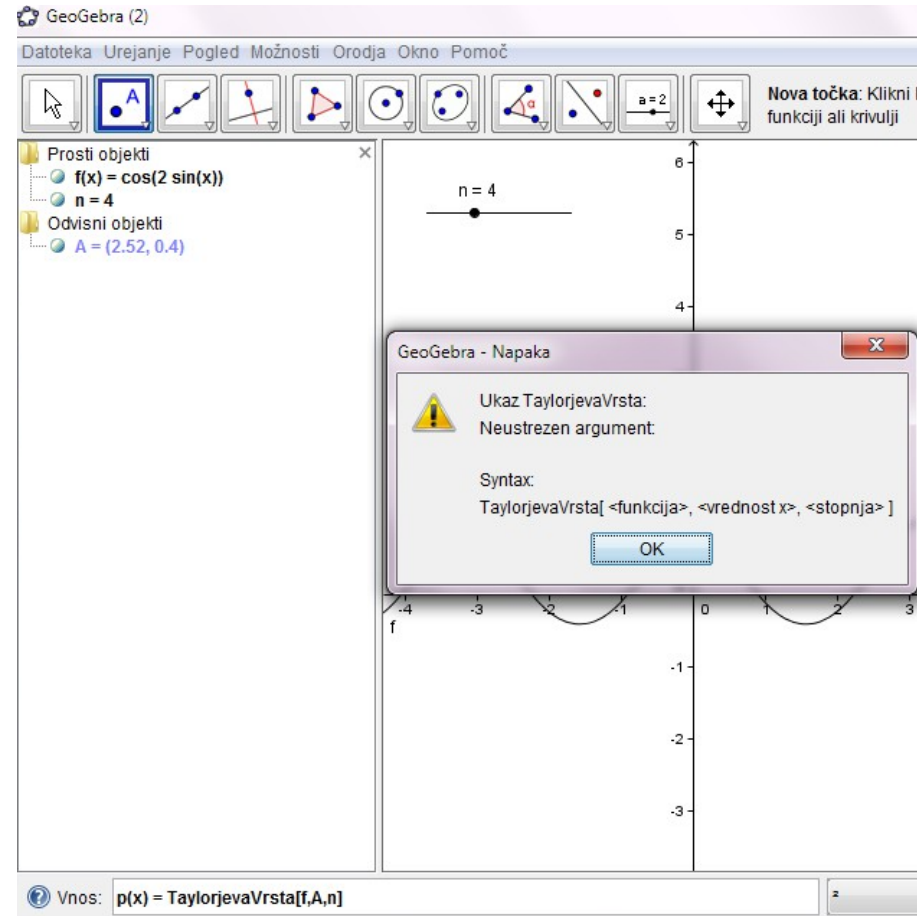
Zgled

- $\cos(2 \sin(x))$ aproksimiramo s TP
- Stopnja z drsnikom



Konstrukcija

- Vnos funkcije
- Vnos drsnika
 - Nastaviti min/max
- Taylorjev polinom
 - $p(x) =$
TaylorjevaVrsta[f,x(A),n]



Prikaz teksta

The screenshot shows the GeoGebra (2) application window. The top menu bar includes 'Datoteka', 'Urejanje', 'Pogled', 'Možnosti', 'Orodja', 'Okno', and 'Pomoč'. The toolbar contains various icons, with the 'Vstavi tekst' icon (ABC) highlighted. A dropdown menu is open, showing options: 'Drnsnik' (with $a=2$), 'Kontrolni okvirček skrivanja in prikazovanja objekta' (checked), 'Vstavi tekst' (with ABC icon), 'Vstavi sliko' (with image icon), and 'Relacija med objektoma' (with $a=b$ icon). The main workspace shows a coordinate system with a sine wave $f(x) = \cos(2 \sin(x))$ and a point $A = (2.52, 0.4)$. A slider for $n=4$ is visible at the top.

The 'Tekst' dialog box is open, showing a text input field containing the formula $f(x) = \text{" + f$. To the right of the input field are two dropdown menus, the first showing 'z' and the second showing 'a'. Below the input field is a checkbox labeled 'Formula v LaTeXu' which is checked. At the bottom right of the dialog are two buttons: 'V redu' and 'Prekini'.

The screenshot shows the GeoGebra (2) application window with the 'Premikanje' (Move) menu open. The menu bar and toolbar are the same as in the previous screenshot. The dropdown menu shows 'Premikanje' (with a four-way arrow icon) and the subtitle 'Izbira in premik objektov (Esc)'. The main workspace shows the same coordinate system with the sine wave $f(x) = \cos(2 \sin(x))$ and point $A = (2.52, 0.4)$. The text $f(x) = \cos(2 \sin(x))$ is now displayed on the graph. A slider for $n=4$ is visible at the top.

Preklop med jeziki

- Vpliva tudi na ukaze

The image displays three screenshots of the GeoGebra software interface, illustrating the process of switching the language. The main window shows a graph of the function $f(x) = \cos(x)$ with its Taylor polynomial approximation of degree $n=10$ centered at $A = (5.046, 0)$. The approximation is given by $p(x) = 0.328 + 0.945(x - 5.046) - 0.328(x - 5.046)^2 / 2! - 0.945(x - 5.046)^3 / 3!$.

The first screenshot shows the 'Object Properties' dialog box for the polynomial object 'p'. The 'Definition' field contains the formula $\text{TaylorPolynomial}[f, x(A), n]$. The 'Caption' field is empty. The 'Show Object' and 'Show Label' checkboxes are checked.

The second screenshot shows the 'Language' menu option selected in the 'Tools' menu. A list of languages is displayed, including Macedonian, Norwegian (Bokmål), Norwegian (Nynorsk), Persian, Polish, Portuguese (Brazil), Portuguese (Portugal), Russian, Serbian, Slovak, Slovenian, Spanish, Swedish, Turkish, Vietnamese, and Welsh. The 'Slovenian' option is highlighted.

The third screenshot shows the 'Lastnosti' (Properties) dialog box for the polynomial object 'p'. The 'Ime' (Name) field contains 'p'. The 'Definicija' (Definition) field contains $\text{TaylorjevaVrstaja}[f, x(A), n]$. The 'Napis' (Caption) field is empty. The 'Prikaz objekta' (Show object) and 'Prikaz opisa' (Show description) checkboxes are checked. The 'Prikaz sledi' (Show trail) and 'Fiksiraj objekt' (Lock object) checkboxes are unchecked. The 'Pomožni objekt' (Auxiliary object) checkbox is also unchecked.