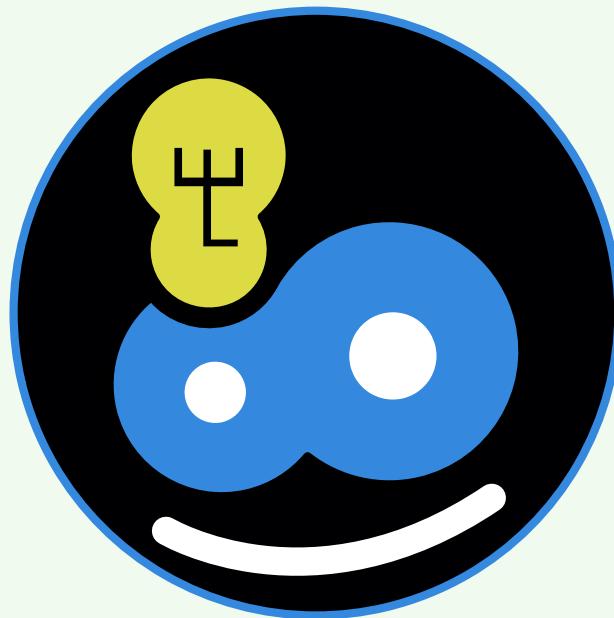


# Ανάπτυξη πλαισίου εκπαιδευτικής εφαρμογής

## Μελέτη περίπτωσης με θέμα τους Εξελικτικούς αλγορίθμους



Του φοιτητή  
Σαράντη Συράκη  
Αρ. Μητρώου: 174973

Επιβλέπων  
Κεραμόπουλος  
Ευκλείδης  
Καθηγητής

# Στόχος

Δημιουργία μιας εφαρμογής που μπορεί να λειτουργήσει ως πλαίσιο για την ανάπτυξη περαιτέρω εκπαιδευτικών εφαρμογών μέσω της προσάρμοσης όλων των παρεχόμενων αρχείων και λειτουργιών

# Τεχνολογίες και Εργαλεία

- Τεχνολογίες WEB (HTML, CSS, JavaScript, Json)
- Google Material Icons
- Bootstrap
- Plotly.js
- Suneditor.js
- PDF.js
- Node.js
- Express.js
- Socket.io

# Πλοήγηση και Βοήθεια

- Πληθώρα μεθόδων πλοήγησης των διάφορων δραστηριοτήτων
- Παροχή ευέλικτου και context aware συστήματος βοήθειας

# Έγγραφα Ύλης

- Εύκολη προσθήκη εγγράφων
- Δυνατότητα προσθήκης συνδέσμων
- Δυνατότητα δημιουργίας σημειώσεων
- Δυνατότητα προσθήκης σελιδοδεικτών
- Αυτόματος συγχρονισμός αλλαγών

# **Ασκήσεις**

**Έχουν υλοποιηθεί κάποια παραδείγματα  
που βρίσκονται μέσα στην ύλη του  
μαθήματος σε μορφή  
παραμετροποιήσιμων ασκήσεων με  
στόχους προς επίτευξη**

# Kouίζ

- Παροχή τεσσάρων ειδών ερωτήσεων
- Παροχή ευέλικτου τρόπου οργάνωσης ερωτήσεων
- Δυνατότητα δημιουργίας κουίζ με πληθώρα επιλογών
- Παροχή υποστήριξης δύο γλωσσών

# Kouίζ

- Σύστημα προόδου των κουίζ
- Δυνατότητα προβολής στατιστικών
- Δυνατότητα ανασκόπησης ερωτήσεων

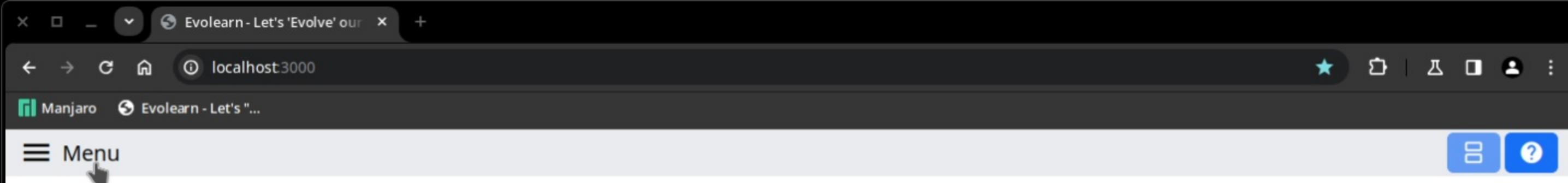
# Ρυθμίσεις

- Δυνατότητα αλλαγής θέματος εφαρμογής
- Δυνατότητα αλλαγής παραμέτρων ήχου
- Δυνατότητα χρήσης εφαρμογής εκτός σύνδεσης
- Πολλές άλλες...

# Ειδοποιήσεις

- Παροχή δυνατότητας αποστολής ειδοποιήσεων παραμετροποίησιμου περιεχομένου στους χρήστες
- Δυνατότητα οργάνωσης και προσαρμογής του τρόπου εμφάνισης τους

**Πλοήγηση και Βοήθεια**



# Waiting for you to select an activity

You can click on the menu  
and chose an activity to display.

[Open menu](#)

X - Evolearn - Let's "Evolve" ou +

localhost3000

Manjaro Evolearn - Let's "...

Evolearn - Let's "Evolve"  
Our learning! X

Study Material

Exercises

Quizzes

Settings

Notifications

About

Waiting for you to select an activity

You can click on the menu and chose an activity to display.

Open menu

Copyleft 2024 ©

This screenshot shows a web-based learning platform interface. At the top, there's a browser header with tabs for 'Evolearn - Let's "Evolve" ou' and 'localhost3000'. Below the header, the page title 'Evolearn - Let's "Evolve"' and subtitle 'Our learning!' are displayed. A close button 'X' is located next to the subtitle. On the left side, a vertical sidebar contains six menu items: 'Study Material' (selected, highlighted in blue), 'Exercises', 'Quizzes', 'Settings', 'Notifications', and 'About'. Each menu item has a corresponding icon. The main content area is currently empty, displaying the message 'Waiting for you to select an activity' in large text, followed by a smaller note: 'You can click on the menu and chose an activity to display.' A blue button labeled 'Open menu' is positioned at the bottom of this message area. In the top right corner of the main content area, there are two small blue icons: a grid icon and a question mark icon. At the very bottom of the page, the copyright notice 'Copyleft 2024 ©' is visible.

# Study Material

Here you can find all the relevant documents for you studying journey



## Introduction

This is the introductory document.  
Make sure to study it thoroughly  
before you go to the next one.



## How to more

This is the follow up.  
It goes more in depth about the  
subjects of selection, mutation  
recombination etc.



## Evolutionary Algorithm Notes

Here you can find the summarization  
of the previous two documents along  
with some additional information  
about genetic strategies.

## Study Material



Here you can fin



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Rest assured that any change to the files will instantly be reflected here.

By clicking on one you will be transferred to the pdf view, where you will be able to read the document, as well as perform all sorts of different actions, such as taking notes, opening links, creating bookmarks and more.

For more information about all those actions please view the help popup in the pdf view.

In the event that a document is removed while you still had notes written inside it, you can click on

[Recover notes from pdf with id : < document id >](#)

and be taken to the note recovery view, where you can backup your inaccessible notes

studying journey



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X - Study Material - What woul +

localhost:3000/?view=pdfView

Manjaro Evolearn - Let's "...

Evolearn - Let's "Evolve"  
Our learning! X

Study Material

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Study Material Exercises Quizzes Settings Notifications About

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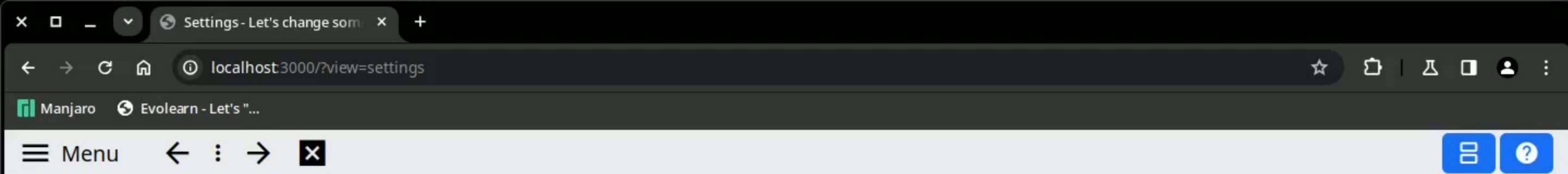
PDF

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PDF

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Copyleft 2024 ©



# Settings

## Application Theme

You can choose between light or dark theme, depending on your preference.

Light Theme



## Volume Control

You can change the volume level, or mute the sound entirely.



100%

Mute Volume ?

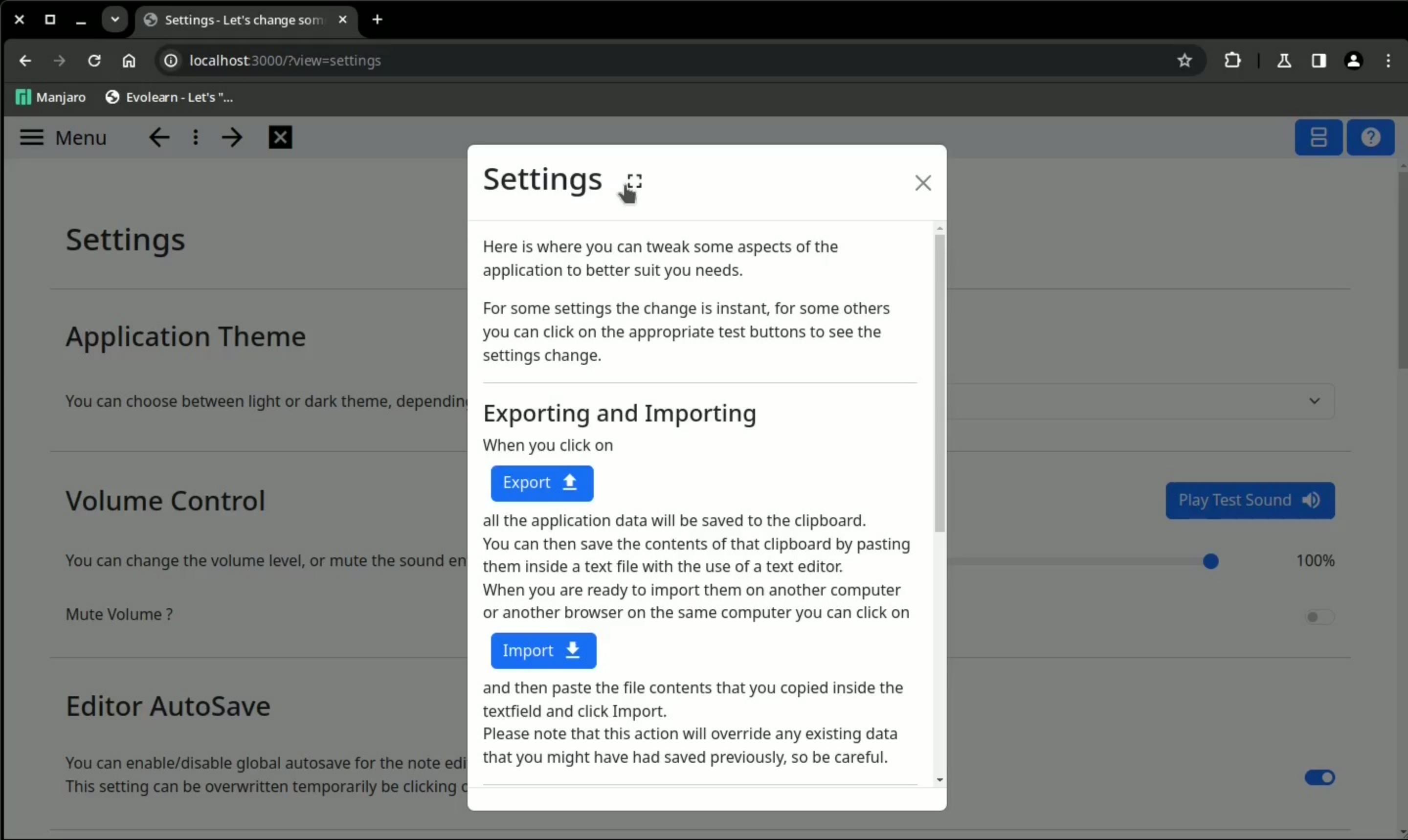


## Editor AutoSave

You can enable/disable global autosave for the note editor.

This setting can be overwritten temporarily by clicking on the autosave button in the editor.





Settings - Let's change som... +

localhost:3000/?view=settings

Manjaro Evolearn - Let's "..."

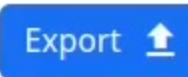
# Settings

Here is where you can tweak some aspects of the application to better suit your needs.

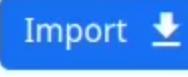
For some settings the change is instant, for some others you can click on the appropriate test buttons to see the settings change.

---

## Exporting and Importing

When you click on  all the application data will be saved to the clipboard.

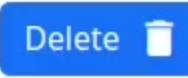
You can then save the contents of that clipboard by pasting them inside a text file with the use of a text editor.

When you are ready to import them on another computer or another browser on the same computer you can click on  and then paste the file contents that you copied inside the textfield and click Import.

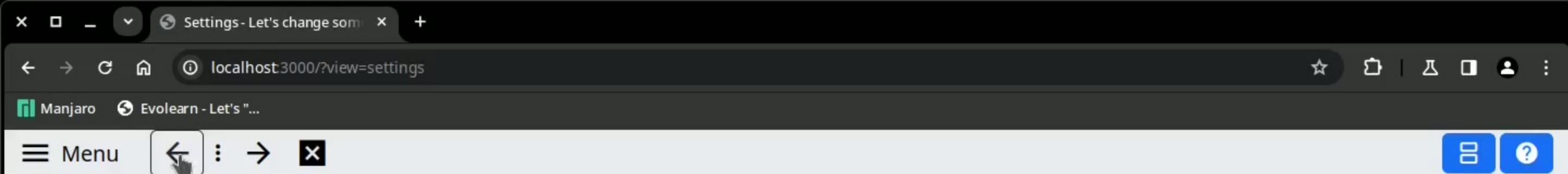
Please note that this action will override any existing data that you might have had saved previously, so be careful.

---

## Deletion and Reset

When you click on  you will get a modal window warning you that this action can not be undone, and that you have to be extra careful, cause if you go through with this action you will delete EVERYTHING stored in the application.

It will revert back to how it was when you first started it.



# Settings

## Application Theme

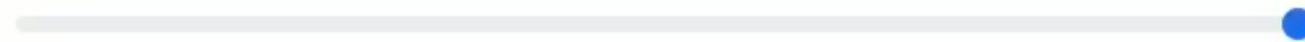
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Light Theme



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100%

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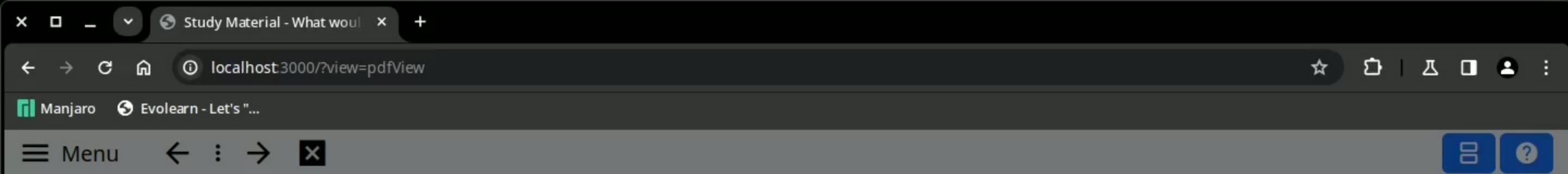


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# Study Material

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Select View ::

**Study Material**

**Settings**



**Introduction**  
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It goes more in depth about the subjects of selection, mutation, recombination etc.



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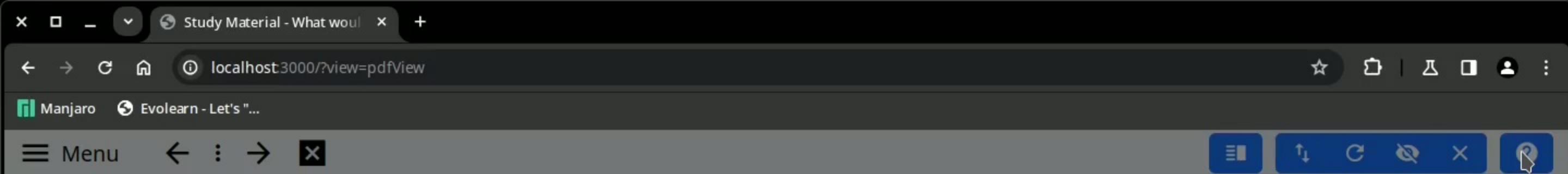
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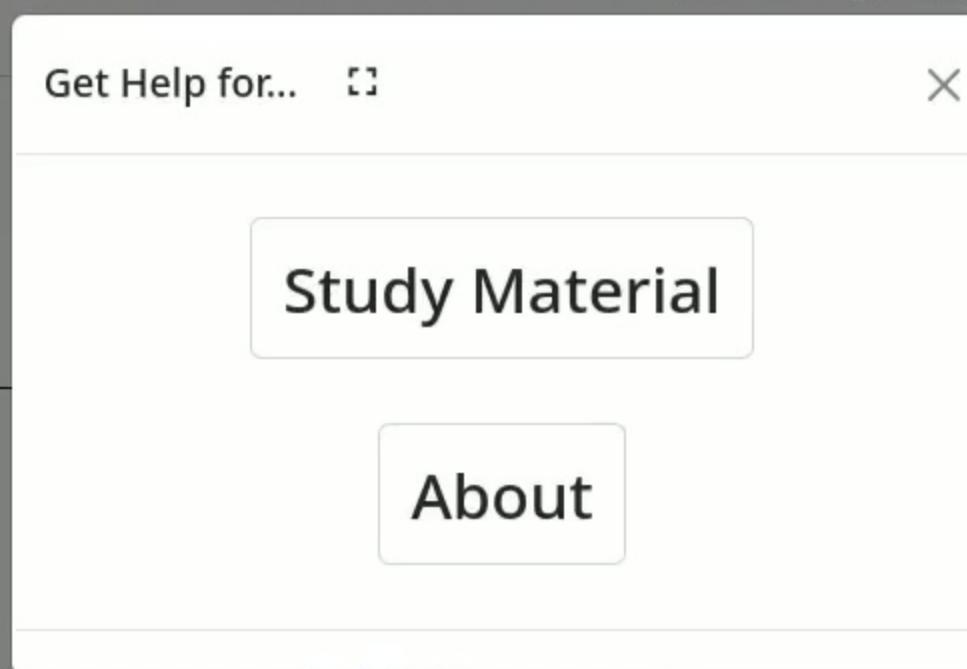
About Evolearn

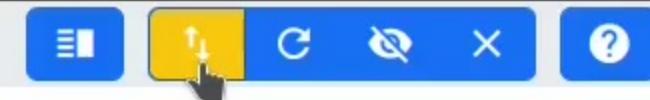




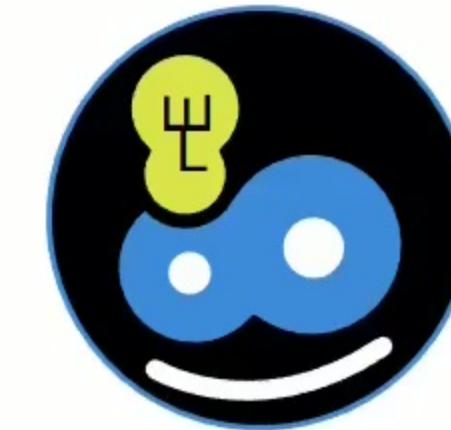
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## About Evolearn



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# About Evolearn



Every single technology that was used to make this application possible is listed right here. The descriptions used came from wikipedia or the website of the technology were applicable



## JavaScript

JavaScript, often abbreviated as JS, is a programming language and core technology of the World Wide



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## JavaScript

JavaScript, often

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Έγγραφα Ύλης

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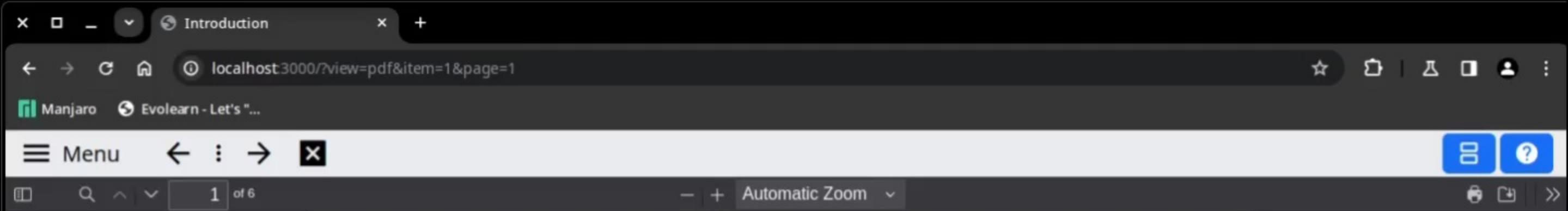
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Εισαγωγή στους  
Εξελικτικούς Αλγόριθμους

Παναγιώτης Αδαμίδης  
Email: adamidis@it.teithe.gr  
URL: <http://eavtos.it.teithe.gr/~adamidis>

EvoNet Flying Circus

## Introduction to Evolutionary Computation

The EvoNet Flying Circus

Brought to you by *P. Adamidis*

The EvoNet Training Committee

EvoNet Flying Circus

- Q What is the most powerful problem solver in the Universe?

A The (human) brain

that created "the wheel, New York, wars and so

Building problem solvers by  
looking at and mimicking:

■ brains → neurocomputing

Actions ...

Introduction

localhost:3000/?view=pdf&item=1&page=2

Manjaro Evolearn - Let's "...

Menu

2 of 6

Automatic Zoom

U.S. San Diego, '60s  
Ann Arbor, '60s

## History (2)

- L. Fogel 1962 (San Diego, CA): *Evolutionary Programming*
- J. Holland 1962 (Ann Arbor, MI): *Genetic Algorithms*
- I. Rechenberg & H.-P. Schwefel 1965 (Berlin, Germany): *Evolution Strategies*
- J. Koza 1989 (Palo Alto, CA): *Genetic Programming*

Evolved Flying Circus

## History (3)

- 1859 Charles Darwin: inheritance, variation, natural selection
- 1957 G. E. P. Box: random mutation & selection for optimization
- 1958 Fraser, Bremermann: computer simulation of evolution
- 1964 Rechenberg, Schwefel: mutation & selection
- 1966 Fogel et al.: evolving automata - "evolutionary programming"
- 1975 Holland: crossover, mutation & selection - "reproductive plan"
- 1975 De Jong: parameter optimization - "genetic algorithm"
- 1989 Goldberg: first textbook
- 1991 Davis: first handbook
- 1993 Koza: evolving LISP programs - "genetic programming"

## The Metaphor

EVOLUTION PROBLEM SOLVING

Individual Candidate Solution

## The Ingredients

t t + 1

reproduction selection

Actions :

Introduction

localhost:3000/?view=pdf&item=1&page=2

Manjaro Evolearn - Let's "...

Menu

2 of 6

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U.C. S. Diego, 1960s Ann Arbor, 1960s

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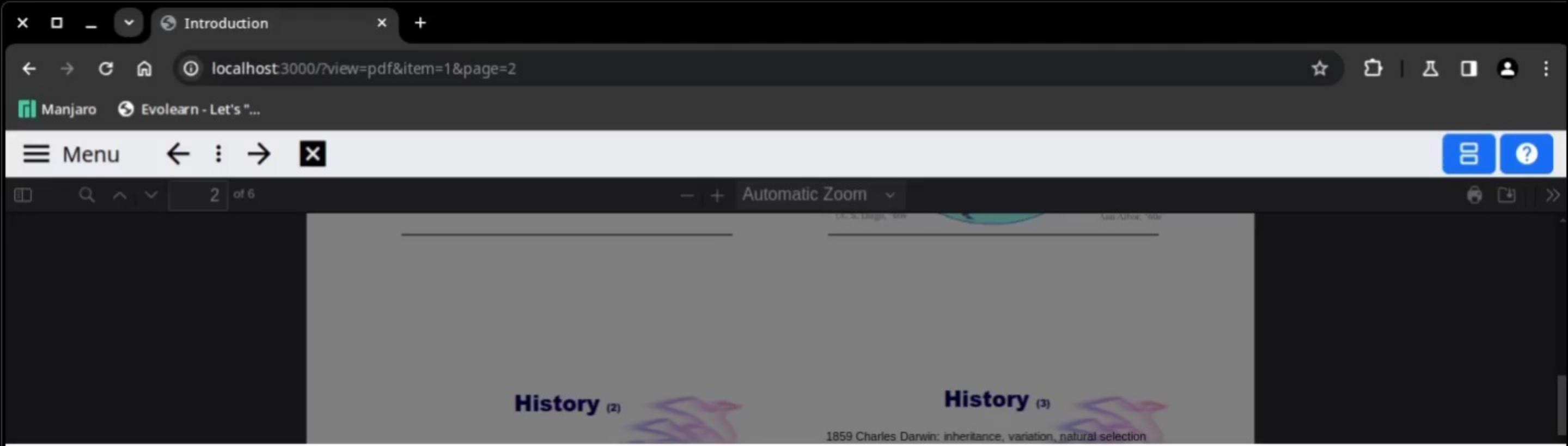
t t + 1

reproduction

selection

Actions :

- Change Pdf
- Reset Links
- Open Notes
- Open Bookmarks
- Fullscreen



Pdf File Select



How to more

localhost:3000/?view=pdf&item=2&page=1

Manjaro Evolearn - Let's "..."

Menu

1 of 15

Automatic Zoom

Actions

## How to Build an Evolutionary Algorithm

Brought to you by *P. Adamidis*  
The EvoNet Training Committee

EvoNet Flying Circus

## Infinite Monkey Theorem



Ένας πίθηκος που χτυπά τυχαία πλήκτρα σε μία γραμμηχανή για απεριόριστο χρονικό διάστημα σχεδόν σίγουρα θα πληκτρολογήσει σποιοδήποτε κείμενο, όπως όλα έργα του William Shakespeare.

## Infinite Monkey Theorem (2)

Ωστόσο, η πιθανότητα δύοις οι πίθηκοι που γεμίζουν το παραπομόσιμο σύμπαν να πληκτρολογήσουν έσπια και ένα πλήρες έργο, όπως ο Άμιλετ του Σαιζπηρ, είναι τόσο μικρή που η πιθανότητα να συμβεί σε μια χρονική περίοδο εκαποντάδων χιλιάδων τάξεων μεγέθους μεγαλύτερη από την ηλικία του σύμπαντος είναι εξαιρετικά χαμηλή (επλέον μη μερικών).

## Richard Dawkins Weasel

- Richard Dawkins, "The Blind Watchmaker", ch 3
- Φράση στόχος: "Methinks it is like a weasel" (28 χαρακτήρες)
- Γραφομηχανή με 27 πλήκτρα και τυχαία πληκτρολόγηση

How to more

localhost:3000/?view=pdf&item=2&page=1

Manjaro Evolearn - Let's "..."

Menu

1 of 15

Automatic Zoom

Info

Search on Wikipedia : Infinite Monkey Theorem

Go to website : [https://www.apstatsmonkey.com/StatsMonkey/TPS3e\\_files/Typin...](https://www.apstatsmonkey.com/StatsMonkey/TPS3e_files/Typin...)

Go to exercise : 1

Go to quiz : 1

Ένας πίθηκος γραμμιχανή για την απεριτορίστικη χρονικό διάστημα σχεδόν στηγουρά θα πληκτρολογήσει οποιοδήποτε κείμενο, όπως όλα έργα του William Shakespeare.

Actions

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localhost:3000/?view=pdf&item=2

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Menu

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Automatic Zoom

Actions

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Change Pdf



Reset Links



Open Notes



Open Bookmarks

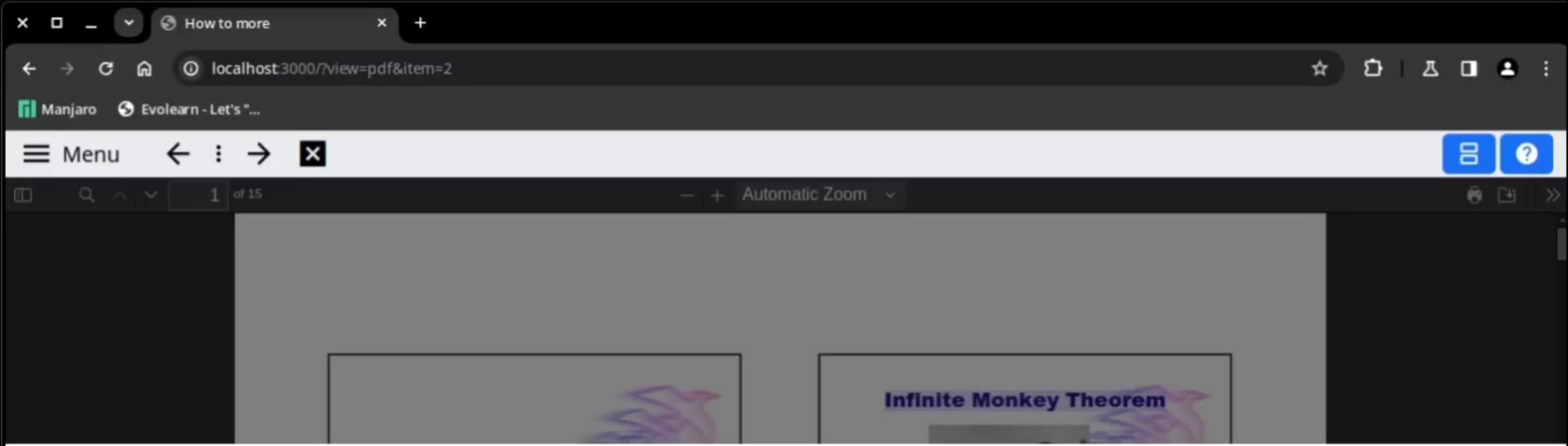


Fullscreen



Actions





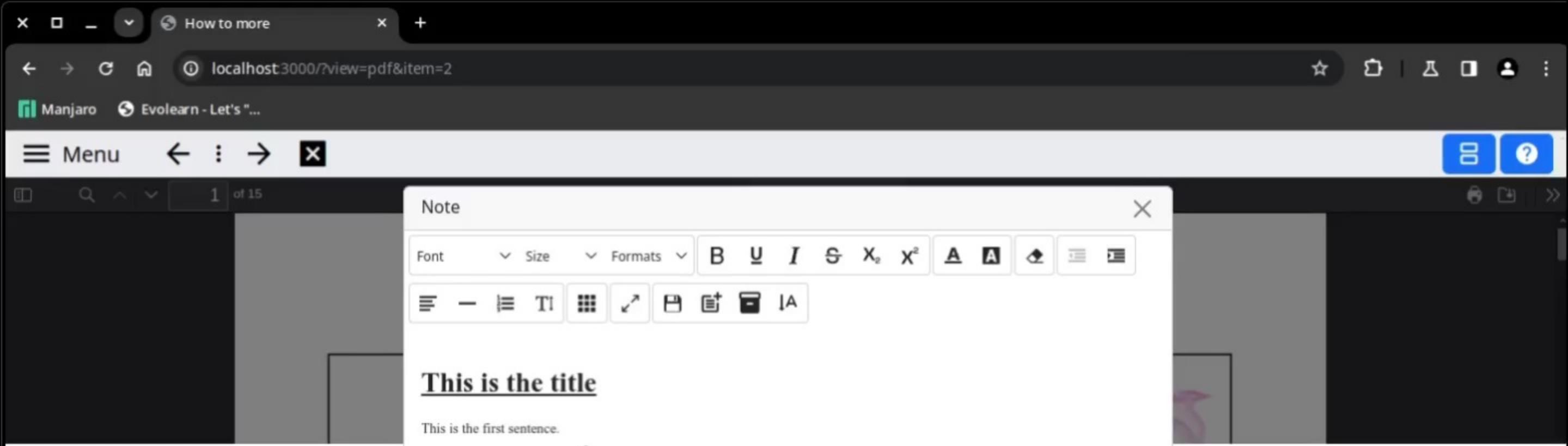
## Pdf Notes

### Add New Note

You can add as many notes as you like.  
Just make sure you don't go crazy with them!

[Add Note +](#)

Note 1	Attention
Title	A note from the teacher
Description	This is in the first pdf document
Updated links	

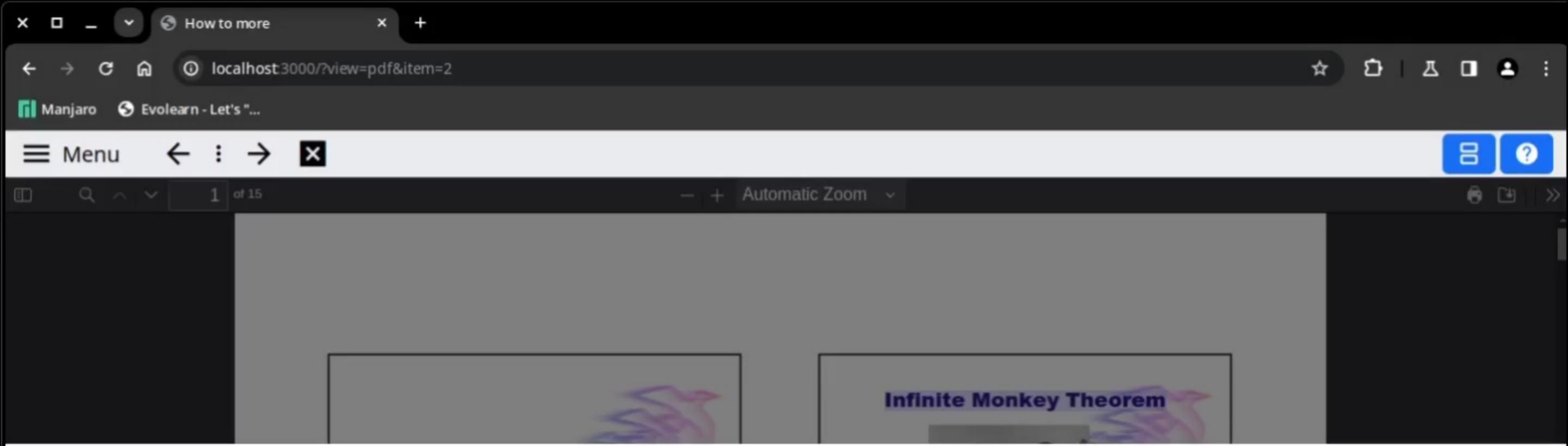


Pdf Notes

Just







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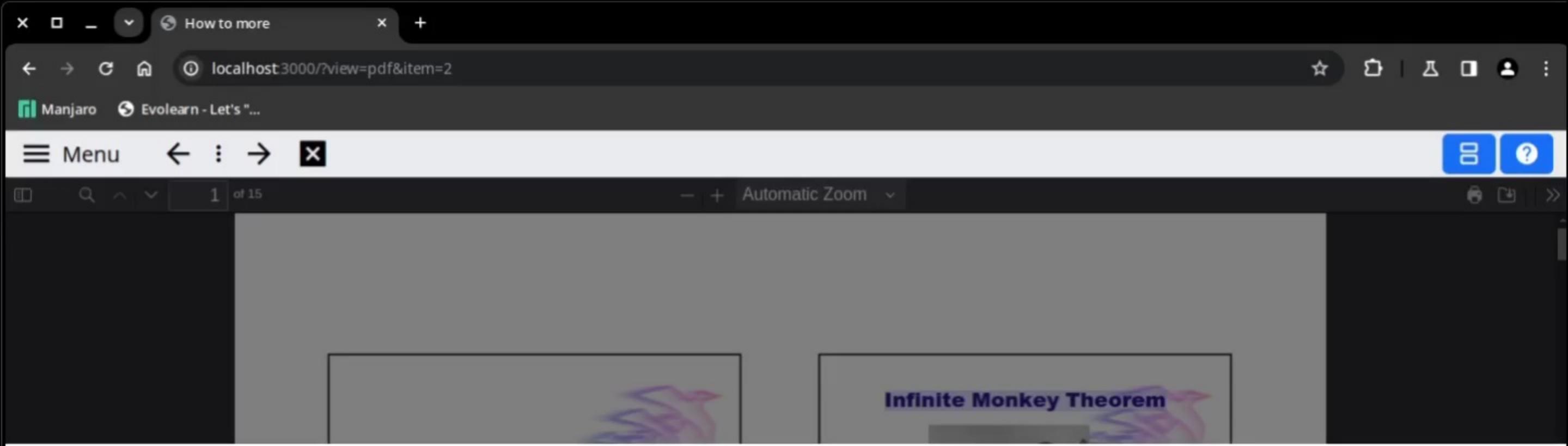
[Add Note +](#)

Note 1      Attention [Edit](#)

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Updated links



## Pdf Notes

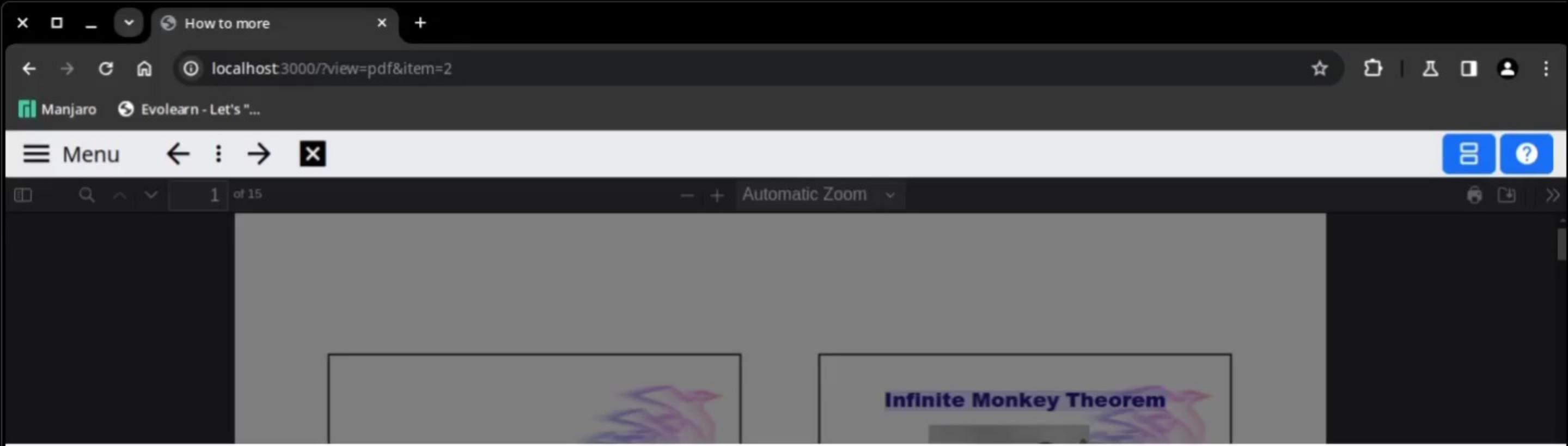
### Add New Note

You can add as many notes as you like.  
Just make sure you don't go crazy with them!

Add Note +

Note 1	Attention	
Title A note from the teacher		
Description This is in the first pdf document		
Updated links		

Note 1	Tue Feb 06 2024	
Title <input type="text"/>		
Description		
Tue, 06 Feb 2024 16:21:05 GMT		



## Pdf Notes

### Add New Note

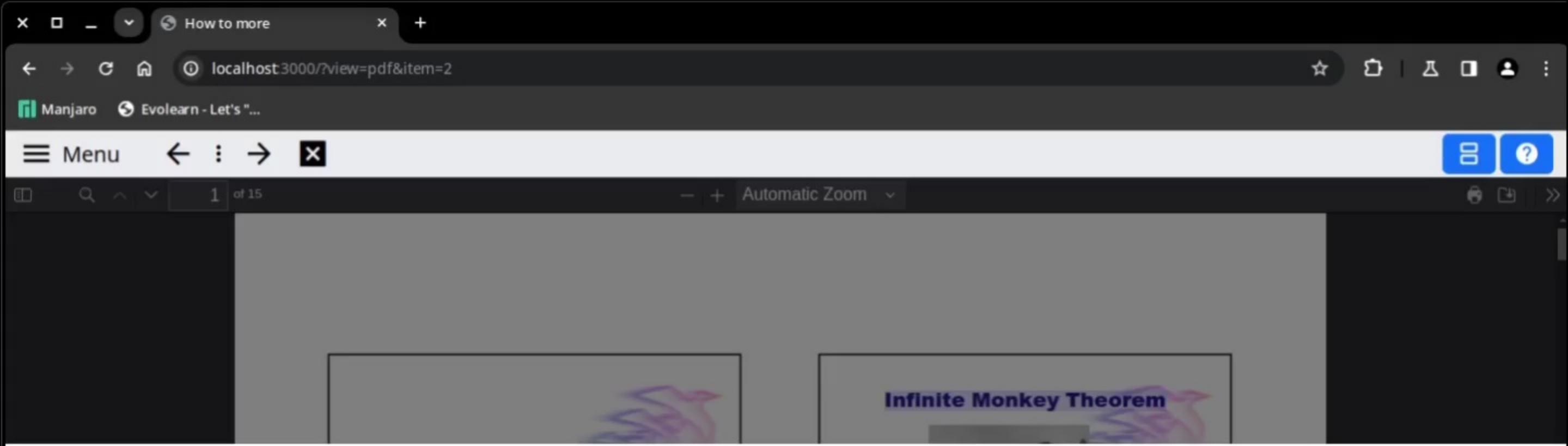
You can add as many notes as you like.  
Just make sure you don't go crazy with them!

[Add Note +](#)

Note 1	Attention
Title A note from the teacher	<a href="#">Edit</a>
Description This is in the first pdf document	
Updated links	

**Creation Date**

Note 1	Tue Feb 06 2024
Title note	<a href="#">Edit</a>
Description test	
Tue, 06 Feb 2024 16:21:05 GMT	



## Pdf Notes

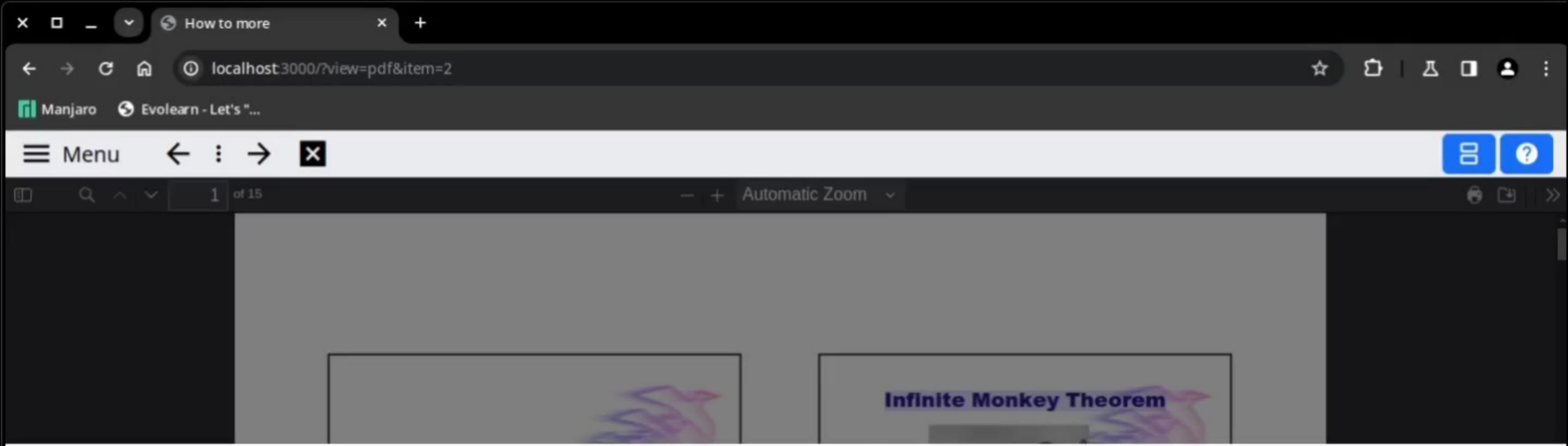
### Add New Note

You can add as many notes as you like.  
Just make sure you don't go crazy with them!

Add Note +

Note 1	Attention
Title A note from the teacher	
Description This is in the first pdf document	
Updated links	

Note 1	Tue Feb 06 2024
Title note	
Description test	
Last Modification Date	Tue, 06 Feb 2024 16:21:05 GMT



## Pdf Notes

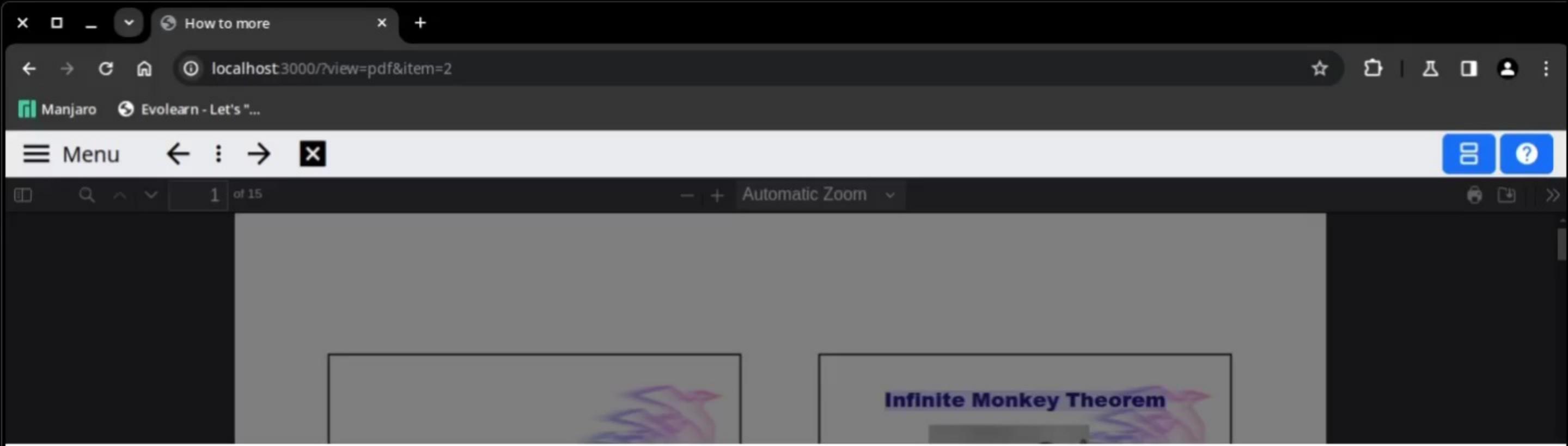
### Add New Note

You can add as many notes as you like.  
Just make sure you don't go crazy with them!

Add Note +

Note 1	Attention	
Title	A note from the teacher	
Description	This is in the first pdf document	
Updated links		

Note 1	Tue Feb 06 2024	
Title	note	
Description	test	
Tue, 06 Feb 2024 16:21:05 GMT		



## Pdf Notes

### Add New Note

You can add as many notes as you like.  
Just make sure you don't go crazy with them!

[Add Note +](#)

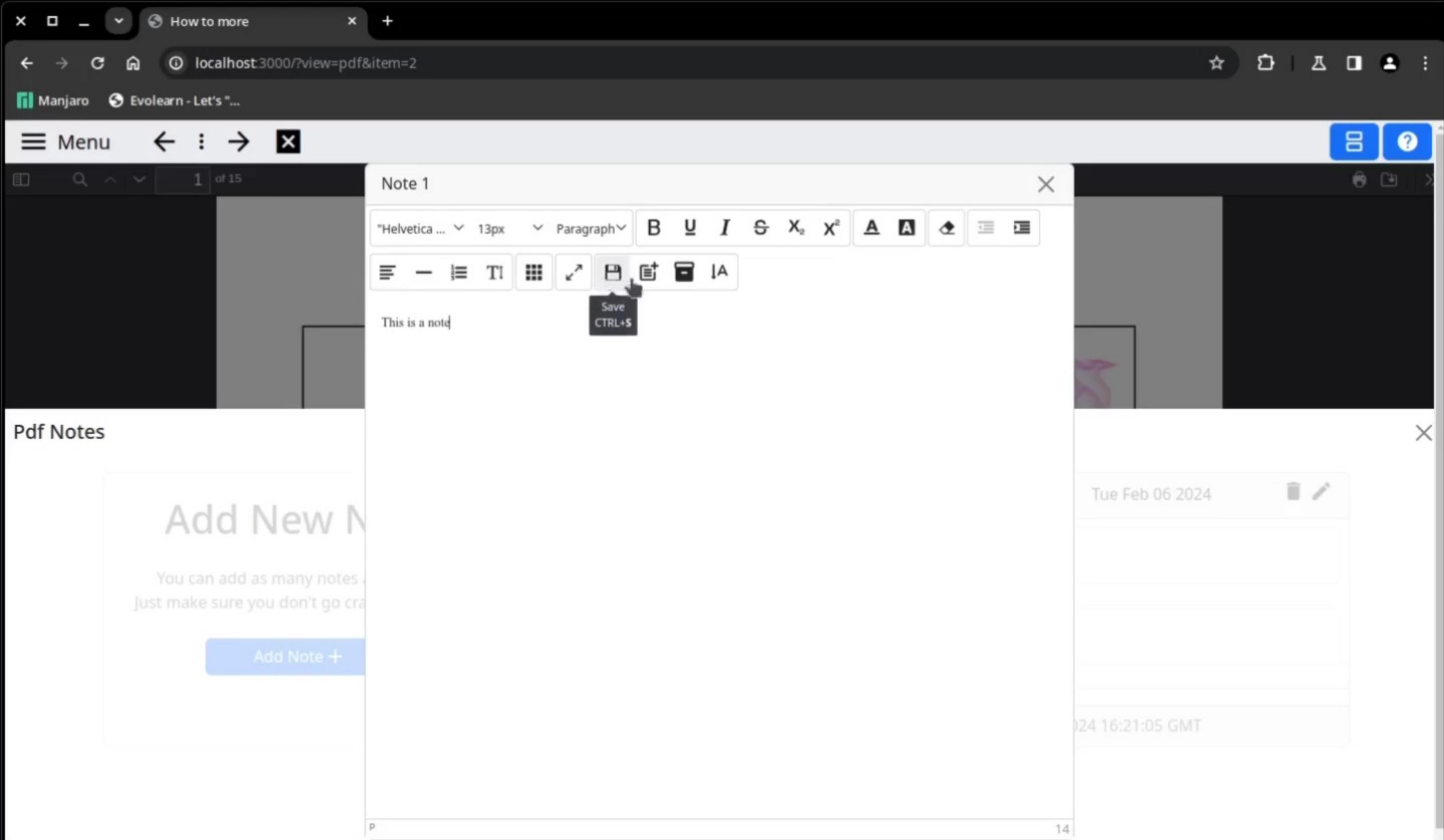
Note 1      Attention [Edit](#)

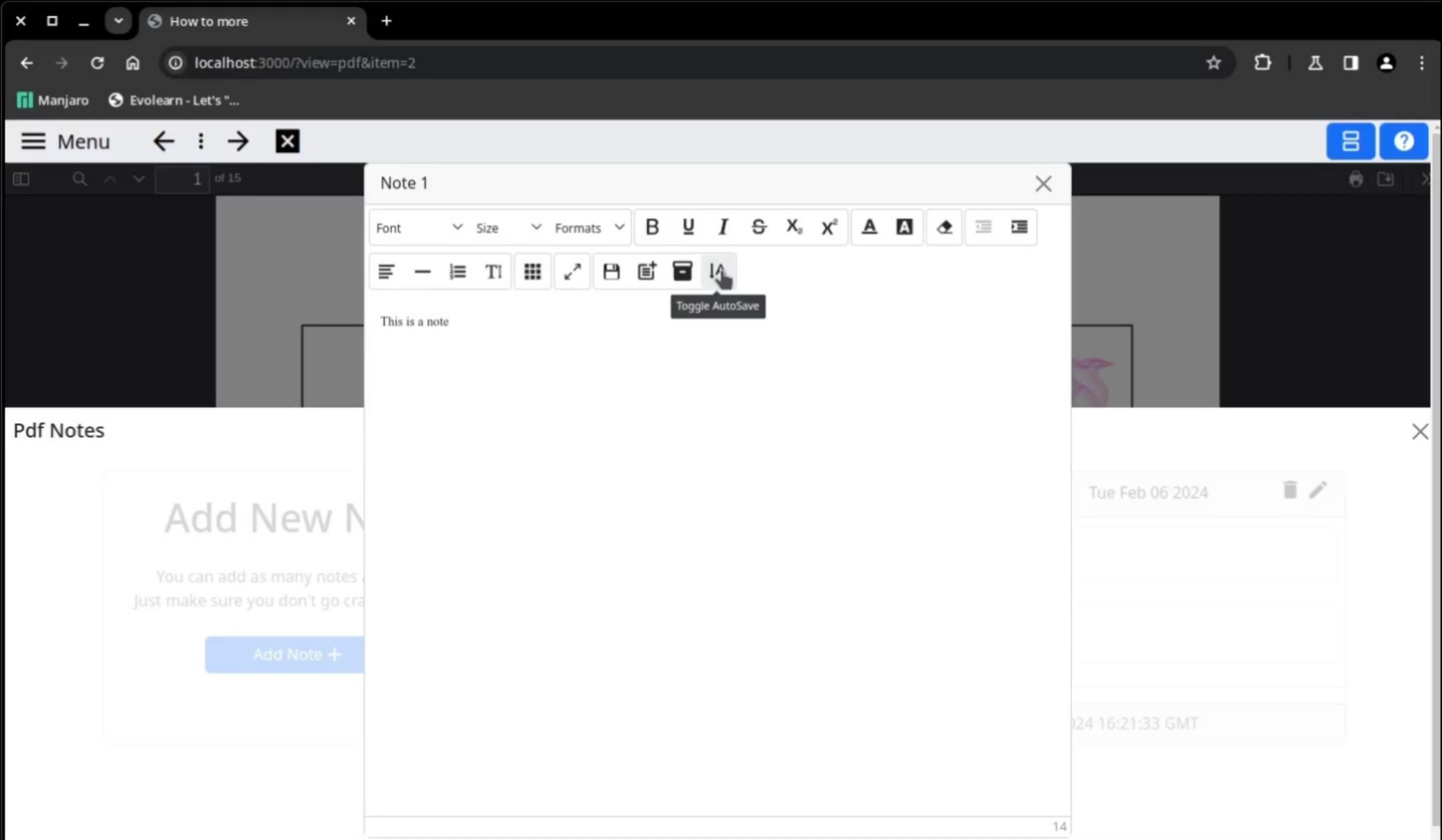
Title	A note from the teacher
Description	This is in the first pdf document
Updated links	

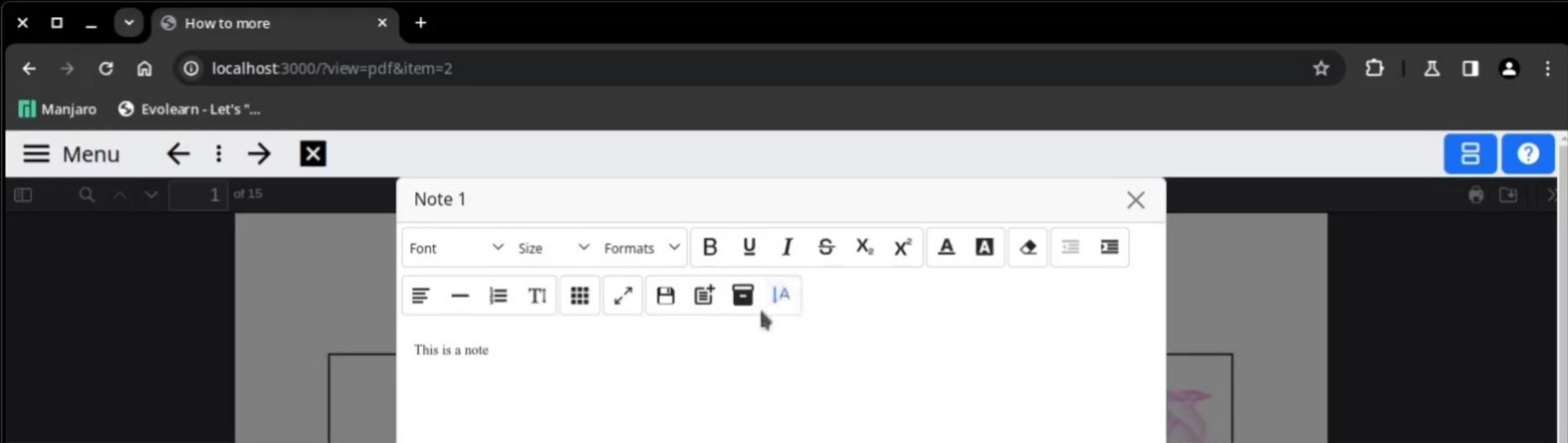
Note 1      Tue Feb 06 2024 [Edit](#)

Title	note
Description	test
Tue, 06 Feb 2024 16:21:05 GMT	









Pdf Notes

## Add New Note

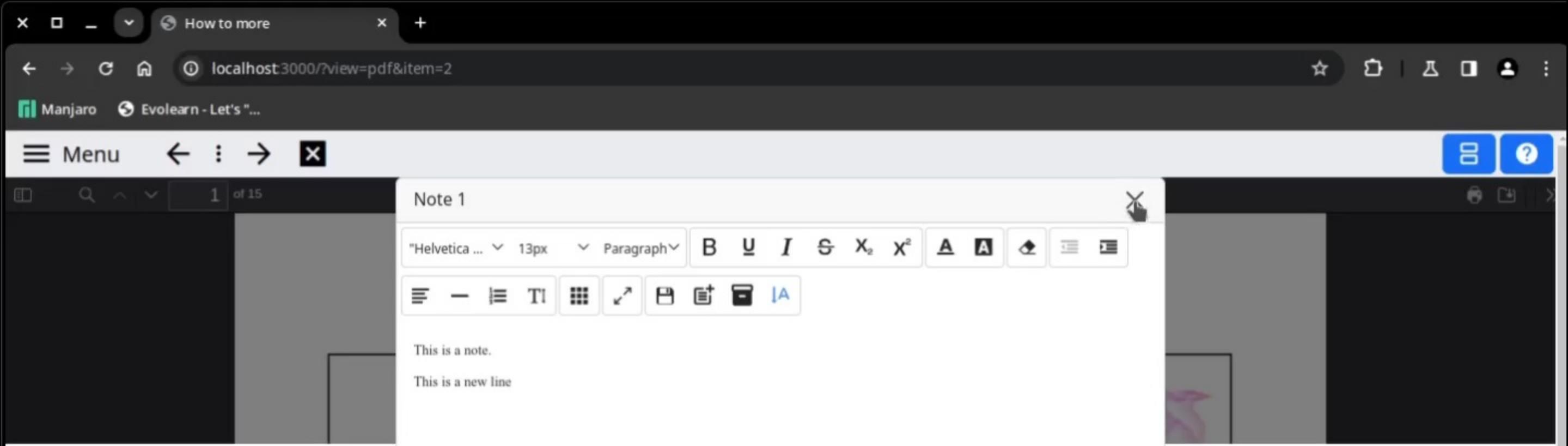
You can add as many notes as you want.  
Just make sure you don't go crazy.

Add Note +

Tue Feb 06 2024

2024 16:21:33 GMT

14



## Pdf Notes

### Add New Note

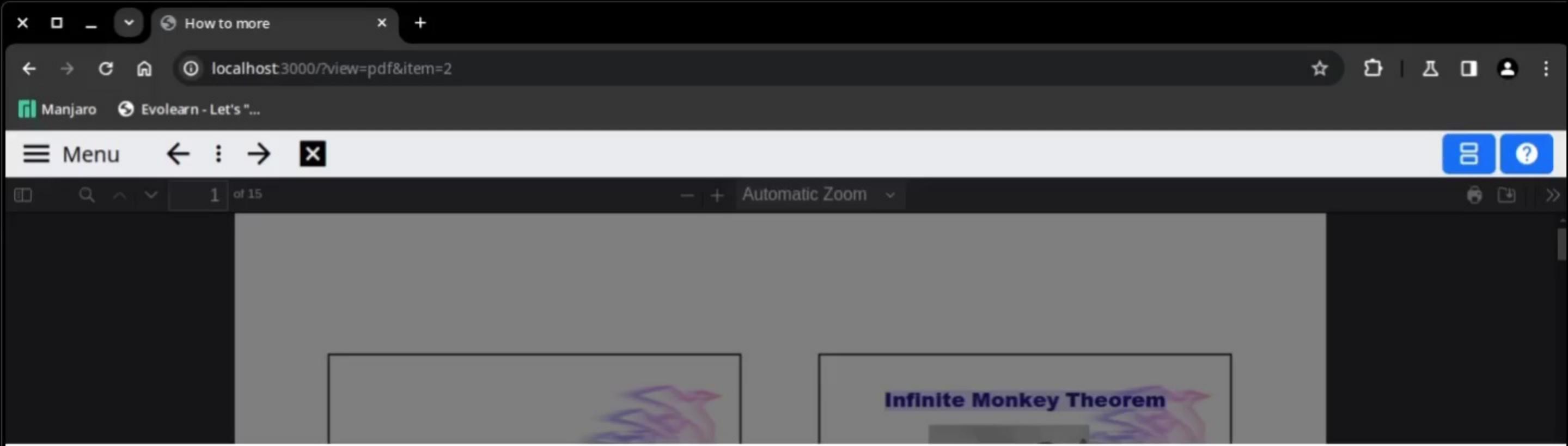
You can add as many notes as you want.  
Just make sure you don't go crazy.

Add Note +

Tue Feb 06 2024



2024 16:21:33 GMT



## Pdf Notes

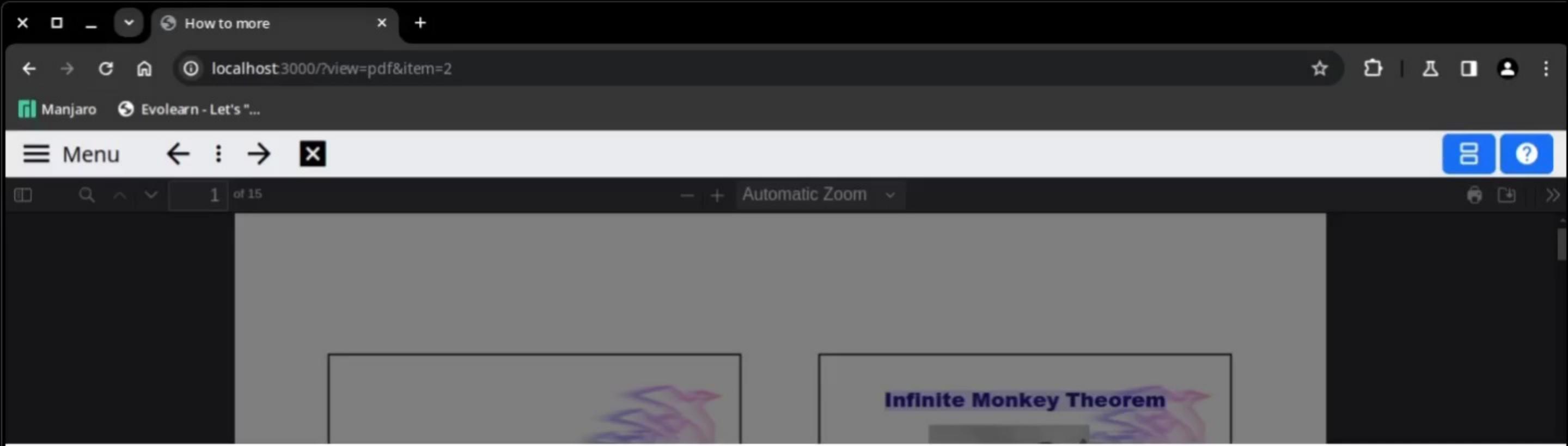
### Add New Note

You can add as many notes as you like.  
Just make sure you don't go crazy with them!

Add Note +

Note 1	Attention	
Title	A note from the teacher	
Description	This is in the first pdf document	
Updated links		

Note 1	Tue Feb 06 2024	
Title	note	
Description	test	
Tue, 06 Feb 2024 16:22:08 GMT		



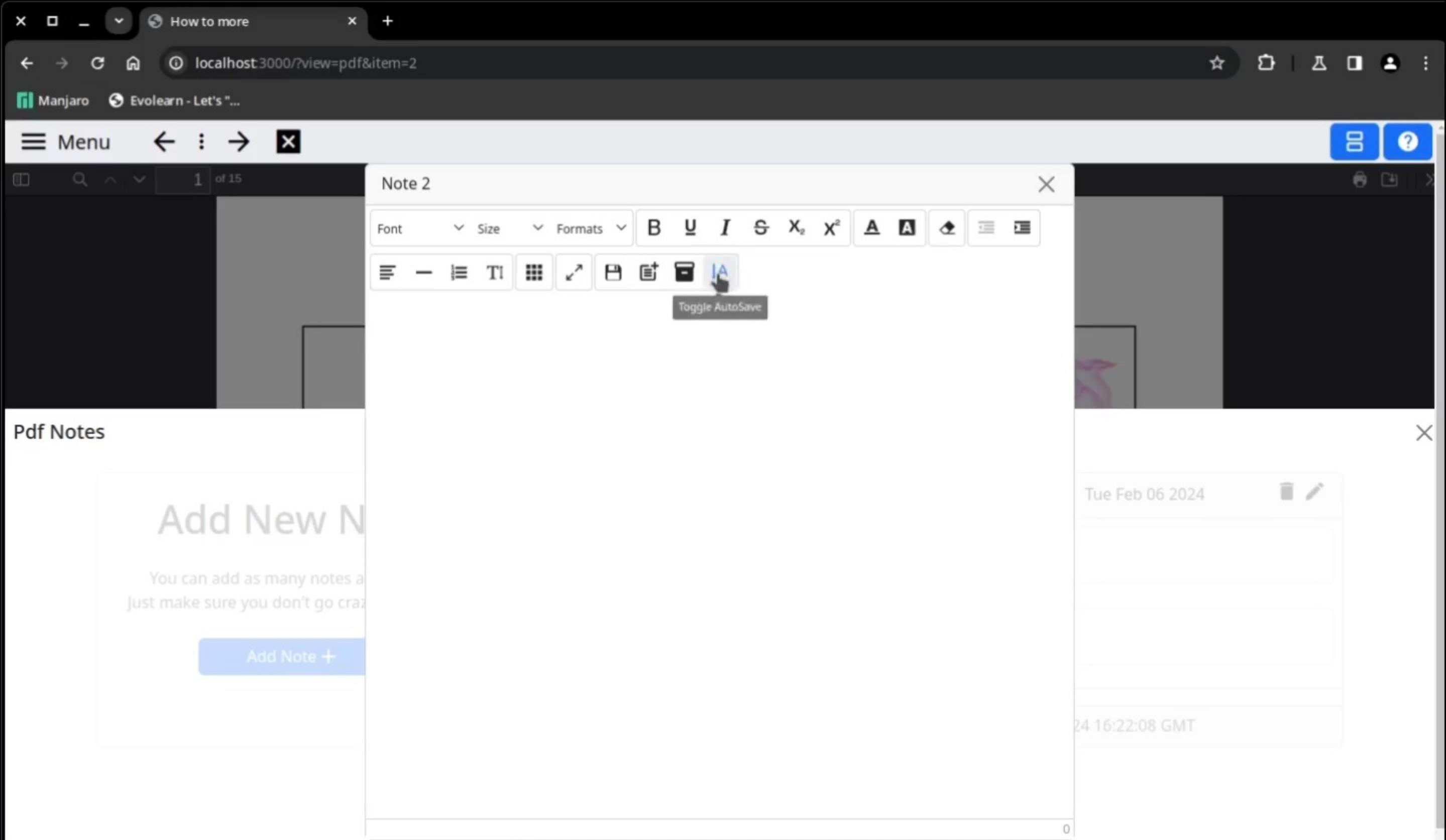
## Pdf Notes

# Add New Note

You can add as many notes as you like.  
Just make sure you don't go crazy with them!

[Add Note +](#)

Note 1	Attention	
Title	A note from the teacher	
Description	This is in the first pdf document	
Updated links		
		<a href="#">Edit   Show Note</a>
Note 2	Tue Feb 06 2024	



How to more

localhost:3000/?view=pdf&item=2

Manjaro Evolearn - Let's ...

Menu ← : → X

Note 2

Font Size Formats B U I S X₂ X² A A Import content to editor

Pdf Notes

Add New N

You can add as many notes as you like. Just make sure you don't go crazy.

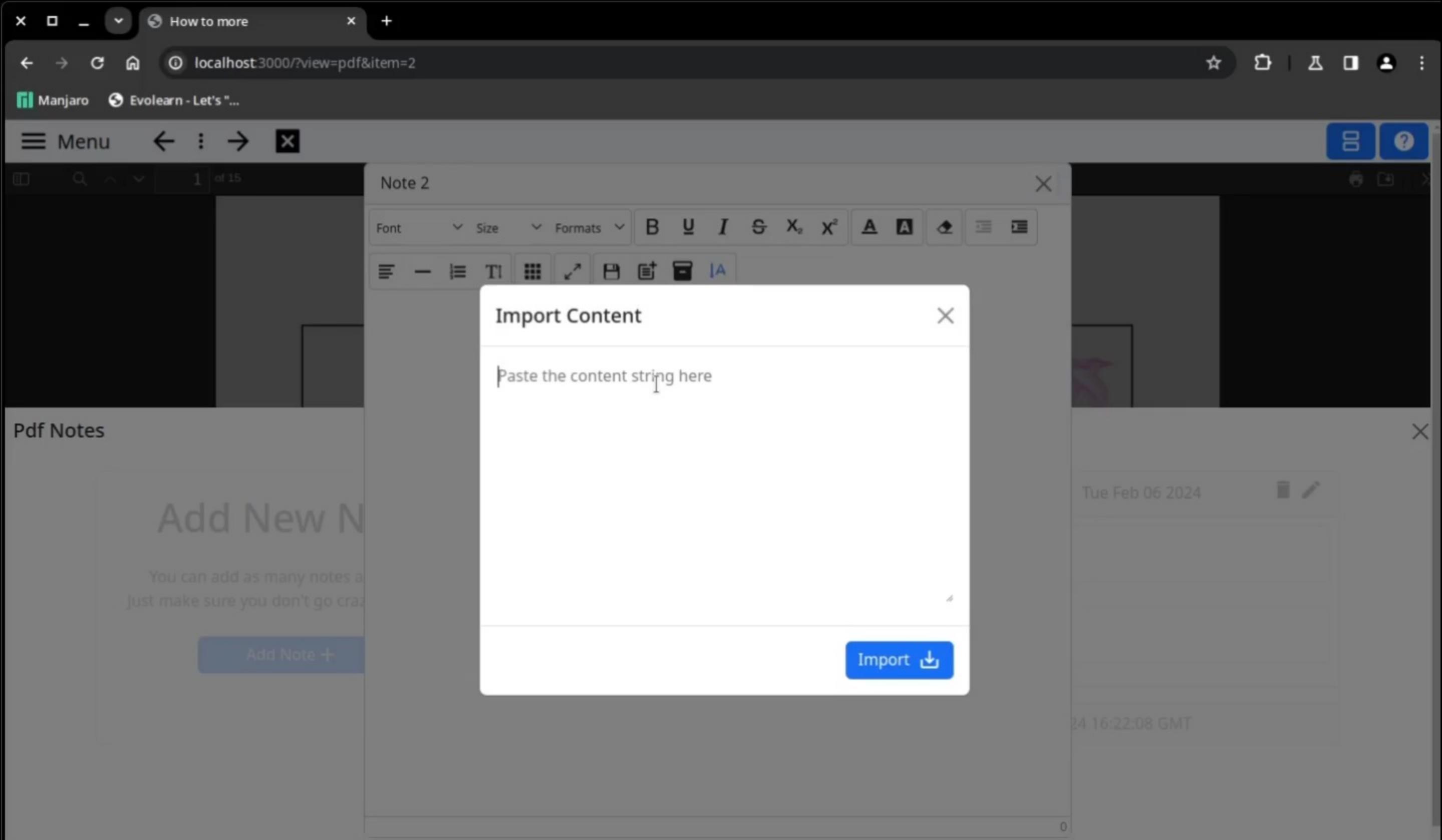
Add Note +

Tue Feb 06 2024

24 16:22:08 GMT

0

A screenshot of a web-based application interface. At the top, there's a browser-like header with tabs, a search bar, and system icons. Below it is a dark-themed sidebar with a 'Pdf Notes' section containing a form to 'Add New Note'. The main area features a 'Note 2' editor window with a toolbar at the top. The toolbar includes buttons for Font, Size, Formats (Bold, Underline, Italic, etc.), and various alignment and list options. A button labeled 'Import content to editor' is also present. To the right of the editor, there's a sidebar with a date ('Tue Feb 06 2024') and time ('24 16:22:08 GMT'). The bottom right corner shows the number '0'.



How to more

localhost:3000/?view=pdf&item=2

Manjaro Evolearn - Let's ...

Menu ← : → X

1 of 15

Pdf Notes

Add New N

You can add as many notes as you want.  
Just make sure you don't go crazy.

Add Note +

Note 2

Font Size Formats B U I S X<sub>2</sub> X<sup>2</sup> A A

Import Content

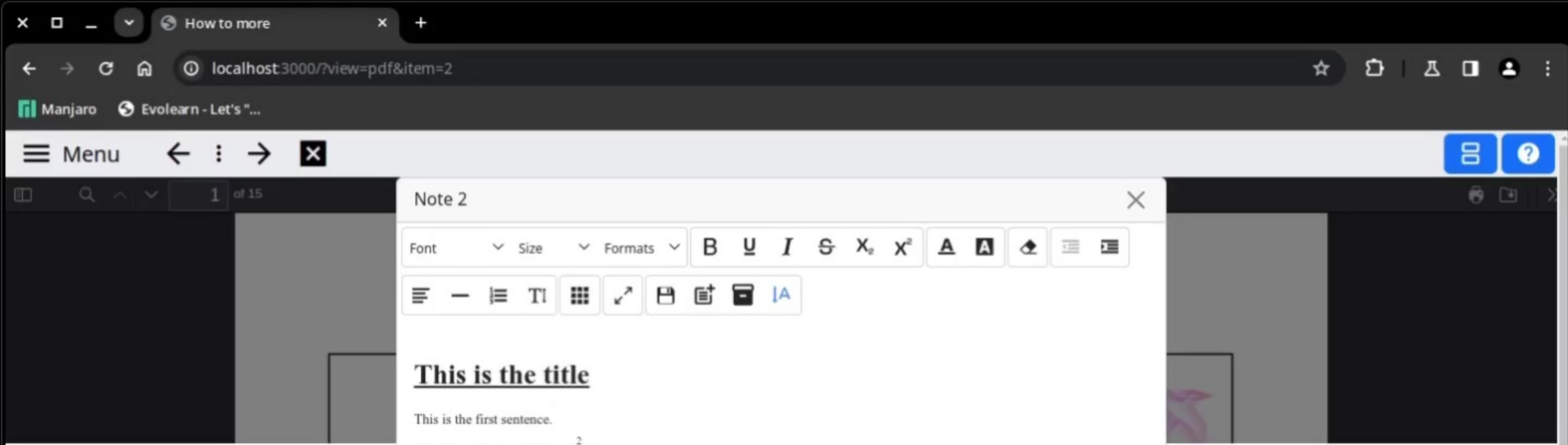
```
.....  
class="se-table-size-100"><tbody><tr><td><div>1<br></div></td><td><div>a<br></div></td><div>b<br></div></td></tr><tr><td><div>1<br></div></td><td><div>a<br></div></td><td><div>b<br></div></td></tr></tbody></table><h1 style="text-align: center"><span style="background-color: #0085cc"><span style="color: #ff0000"><del>This title is centered</del></span></span><br><hr class="se_solid_on"><p>This is a list:<br><ol><li>Item 1<br><li>Item 2<br><li>Item 3<br></ol></p>
```

Import ↓

Tue Feb 06 2024

24 16:22:08 GMT

0

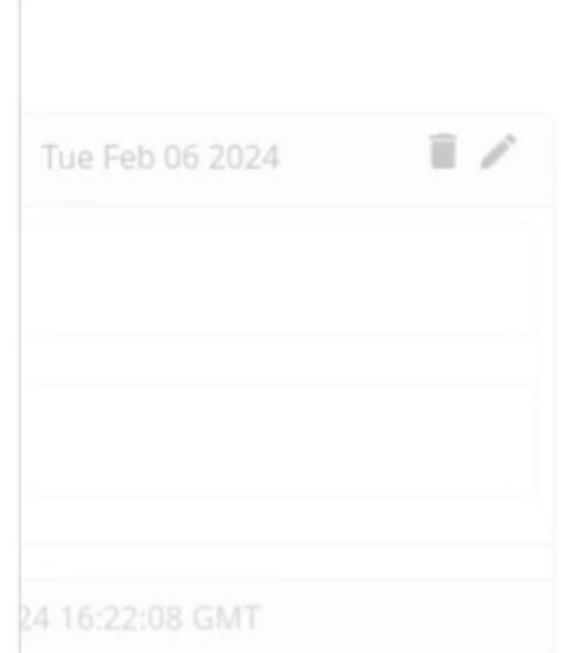


Pdf Notes

## Add New N

You can add as many notes as you want.  
Just make sure you don't go crazy.

Add Note +





## Editor AutoSave

You can enable/disable global autosave for the note editor.

This setting can be overwritten temporarily by clicking on the autosave button in the editor.



## Teacher Notes

You can show/hide the notes included in the study material and the exercises.

Make sure to check them frequently for any changes.



## Do Not Disturb Mode

You can decide whether or not to display the teacher notifications the moment they are sent.

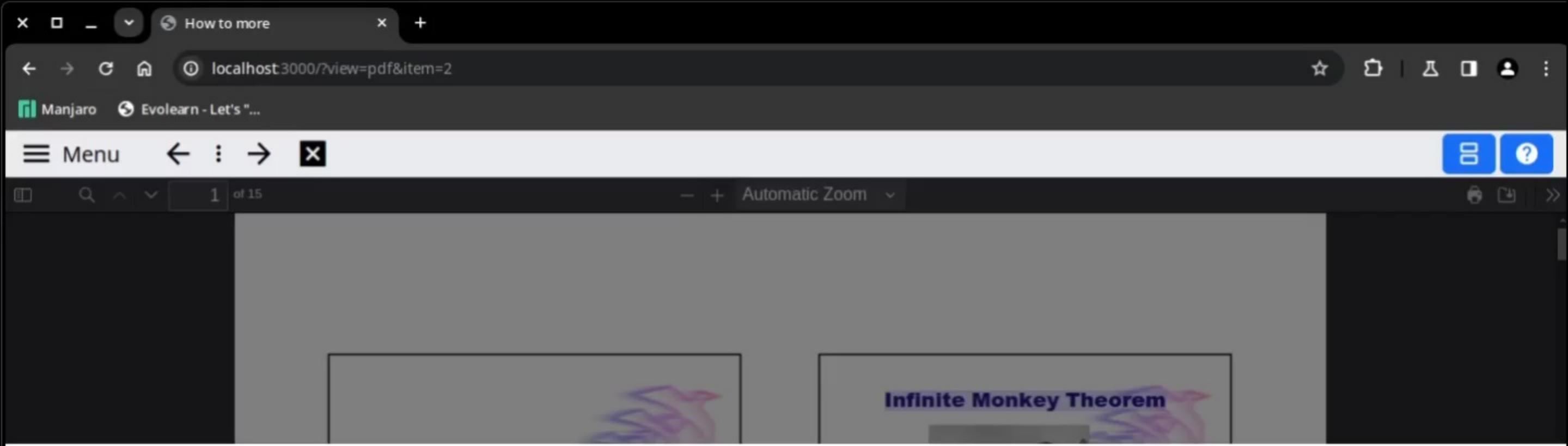
If you enable this mode of operation, the menu notifications item will show you how many you have missed.



## Offline Support Mode

[Restart Application](#)

You can enable/disable the application's ability to function offline.



## Pdf Notes

### Add New Note

You can add as many notes as you like.  
Just make sure you don't go crazy with them!

Add Note +

Note 1	Tue Feb 06 2024	
Title note		
Description test		
Tue, 06 Feb 2024 16:22:08 GMT		

Note 2	Tue Feb 06 2024	
Title		
Description		
Tue, 06 Feb 2024 16:22:30 GMT		

How to more

localhost:3000/?view=pdf&item=2

Manjaro Evolearn - Let's "..."

Menu

1 of 15

Automatic Zoom

Actions :

## How to Build an Evolutionary Algorithm

Brought to you by *P. Adamidis*  
The EvoNet Training Committee

EvoNet Flying Circus

## Infinite Monkey Theorem



Ένας πίθηκος που χτυπά τυχαία πλήκτρα σε μία γραμμηχανή για απεριόριστο χρονικό διάστημα σχεδόν σίγουρα θα πληκτρολογήσει στοιοδήποτε κείμενο, όπως όλα έργα του William Shakespeare.

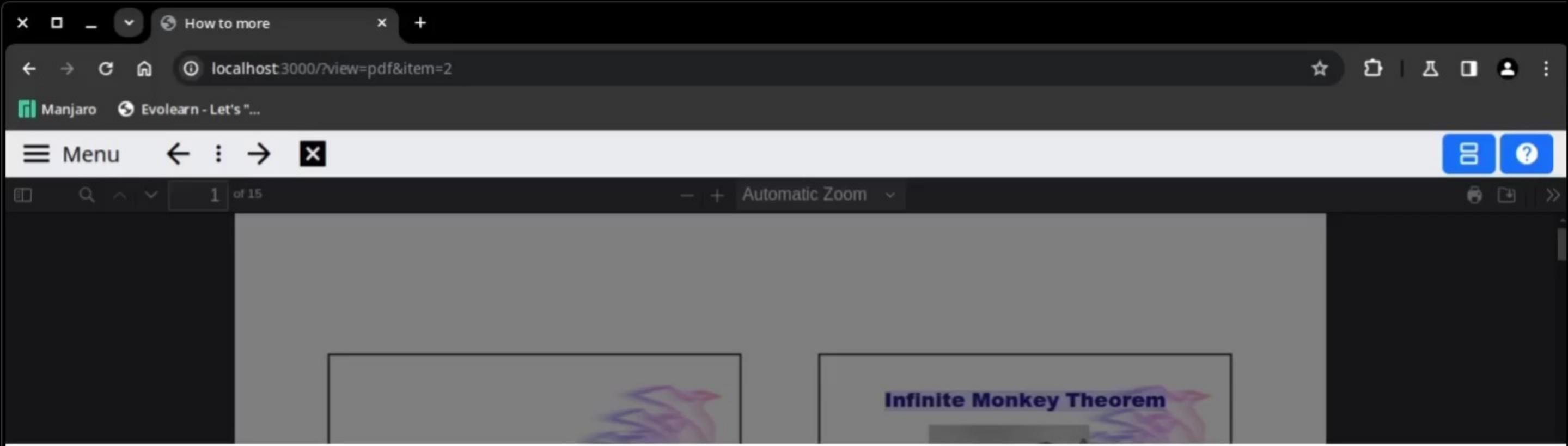
## Infinite Monkey Theorem (2)

Ωστόσο, η πιθανότητα δύοις οι πίθηκοι που γεμίζουν το παραπομόσιμο σύμπαν να πληκτρολογήσουν έστια και ένα πλήρες έργο, όπως ο Αμλέτ του Σαιξτηρ, είναι τόσο μικρή που η πιθανότητα να συμβεί σε μια χρονική περίοδο εκαποντάδων χιλιάδων τάξεων μεγέθους μεγαλύτερη από την ηλικία του σύμπαντος είναι εξαιρετικά χαμηλή (επλέον μηνιανή).

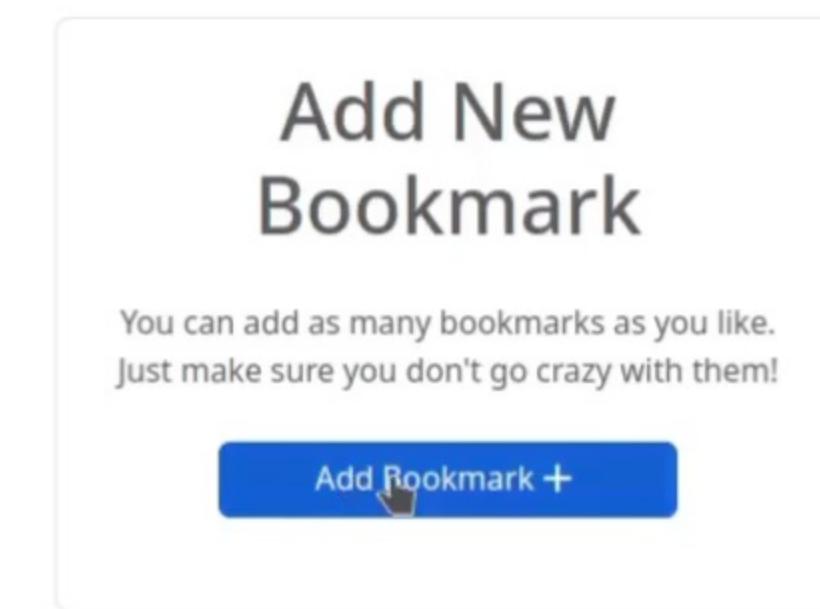
## Richard Dawkins Weasel

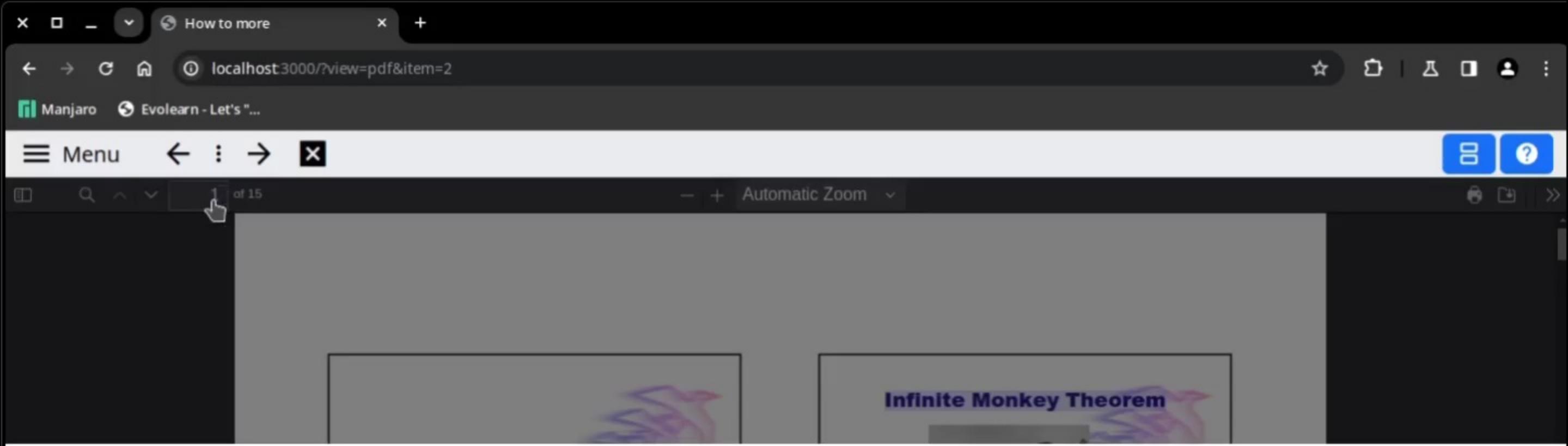
- Richard Dawkins, "The Blind Watchmaker", ch 3
- Φράση στόχος: "Methinks it is like a weasel" (28 χαρακτήρες)
- Γραφομηχανή με 27 πλήκτρα και τυχαία πληκτρολόγηση

- Change Pdf
- Reset Links
- Open Notes
- Open Bookmarks
- Fullscreen
- Actions :



Pdf Bookmarks





## Pdf Bookmarks

### Add New Bookmark

You can add as many bookmarks as you like.  
Just make sure you don't go crazy with them!

Add Bookmark +

Bookmark 1

Tue Feb 06 2024



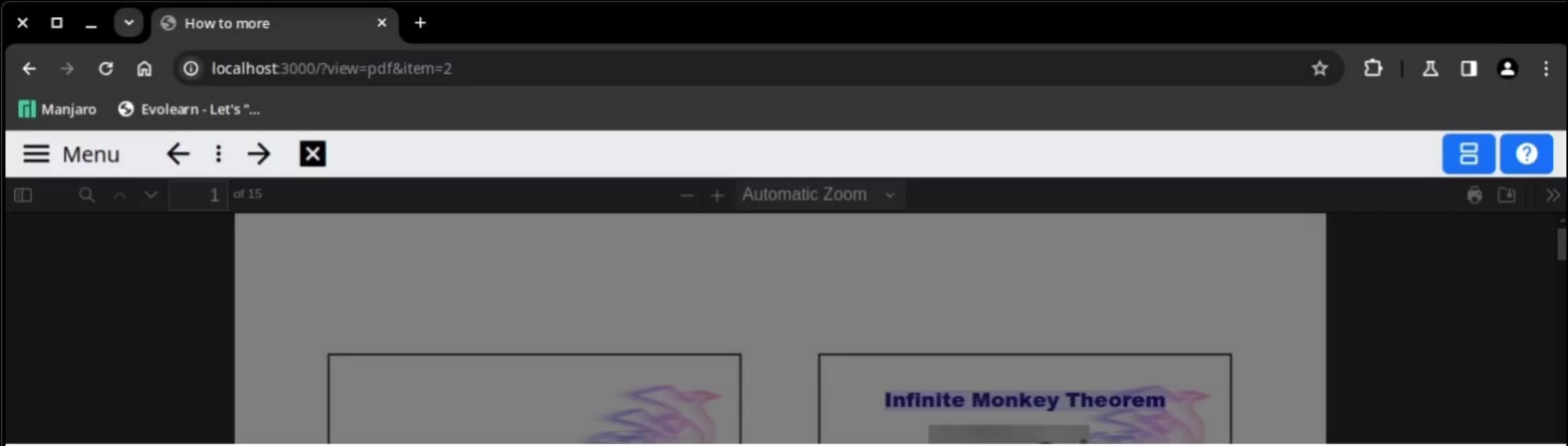
Title

Page Number

1

Go To Page





## Pdf Bookmarks

### Add New Bookmark

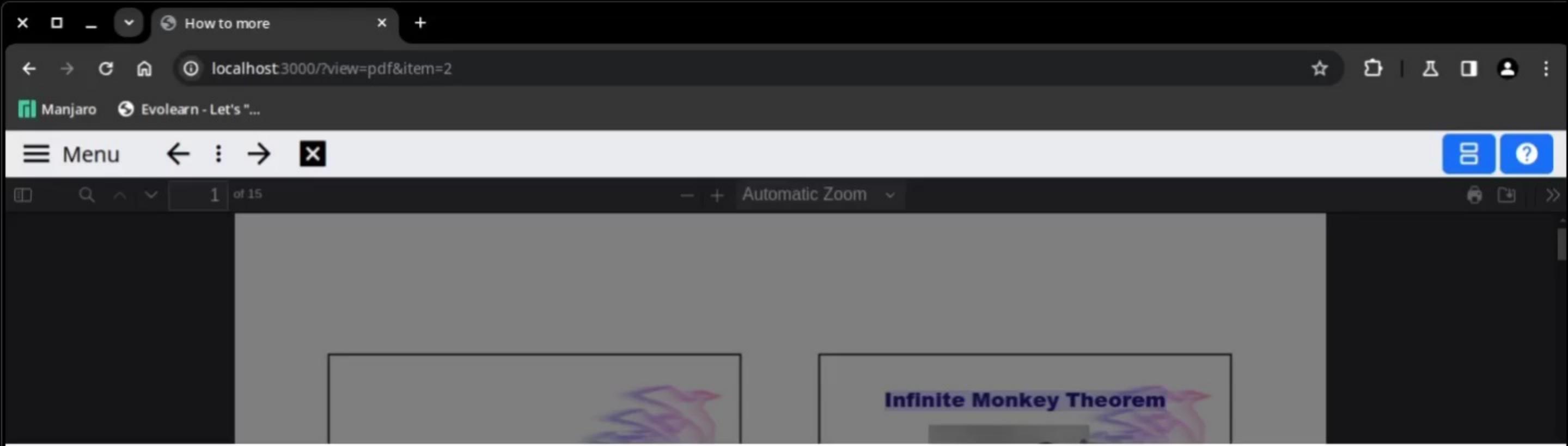
You can add as many bookmarks as you like. Just make sure you don't go crazy with them!

[Add Bookmark +](#)

Bookmark 1      Tue Feb 06 2024 [Delete](#)

Title

Page Number  [Go To Page →](#)



## Pdf Bookmarks

### Add New Bookmark

You can add as many bookmarks as you like. Just make sure you don't go crazy with them!

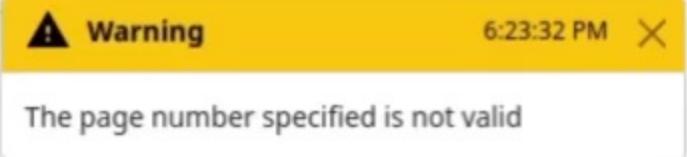
[Add Bookmark +](#)

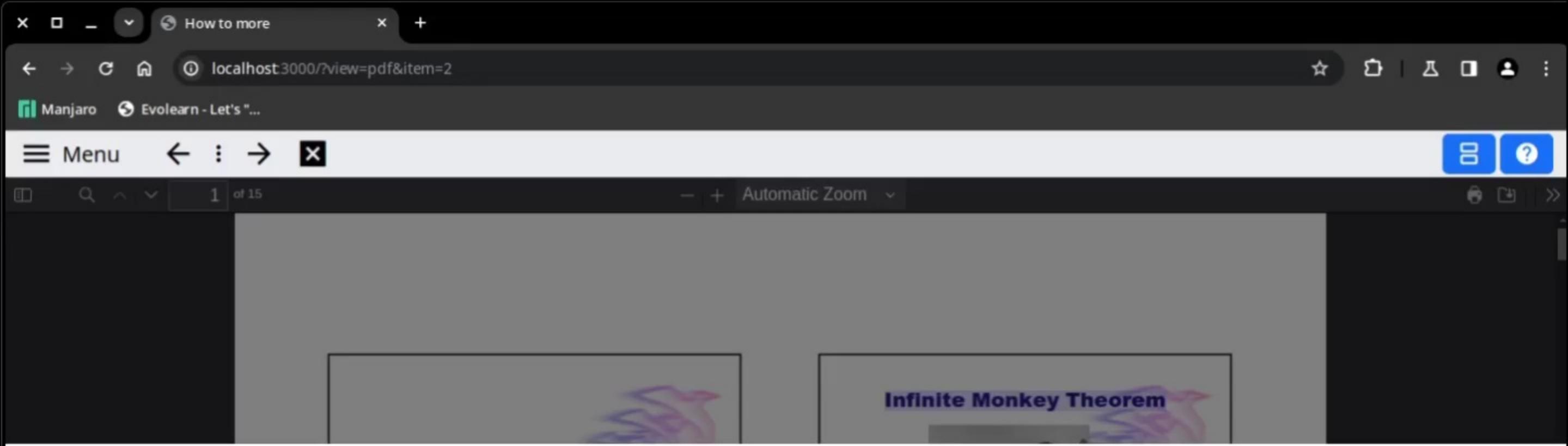
Bookmark 1   Tue Feb 06 2024 [Delete](#)

Title

Page Number

[Go To Page →](#)





## Pdf Bookmarks

### Add New Bookmark

You can add as many bookmarks as you like. Just make sure you don't go crazy with them!

[Add Bookmark +](#)

Bookmark 1	Tue Feb 06 2024	<a href="#">Delete</a>
Title		
Page Number		
10		
<a href="#">Go To Page</a>		

### Αντικατάσταση (Εισαγωγή νέων ατόμων)

(5,3,4,6,2)	(2,4,6,3,5)	(5,4,2,6,3)
(3,4,5,6,2)	(2,3,6,4,5)	(3,4,5,2,6)
(3,5,4,6,2)	(4,5,3,6,2)	(5,4,2,3,6)
(4,6,3,2,5)	(3,4,2,6,5)	(3,6,5,1,4)

### Συνέχεια στην εξέλιξη...

(5,3,4,6,2)	(2,4,6,3,5)	(5,4,2,6,3)
(3,4,5,6,2)	(2,3,6,4,5)	(3,4,5,2,6)
(3,5,4,6,2)	(4,5,3,6,2)	(5,4,2,3,6)
(4,6,3,2,5)	(3,4,2,6,5)	(3,6,5,1,4)

### Replacement Strategy

The selection pressure is also affected by the way in which we decide which members of the population to kill in order to make way for our new individuals.

### Replacement Strategy (2)

- Generational Replacement
  - Οι απόγονοι αντικαθίσταν συνολικά τους γονείς.
- Steady State Replacement

### Αντικατάσταση (Εισαγωγή νέων ατόμων)

(5,3,4,6,2)	(2,4,6,3,5)	(5,4,2,6,3)
(3,4,5,6,2)	(2,3,6,4,5)	(3,4,5,2,6)
(3,5,4,6,2)	(4,5,3,6,2)	(5,4,2,3,6)
(4,6,3,2,5)	(3,4,2,6,5)	(3,6,5,1,4)

### Συνέχεια στην εξέλιξη...

(5,3,4,6,2)	(2,4,6,3,5)	(5,4,2,6,3)
(3,4,5,6,2)	(2,3,6,4,5)	(3,4,5,2,6)
(3,5,4,6,2)	(4,5,3,6,2)	(5,4,2,3,6)
(4,6,3,2,5)	(3,4,2,6,5)	(3,6,5,1,4)

### Replacement Strategy

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- » Generational Replacement
  - » Οι απόγονοι αντικαθίστανται συνολικά τους γονείς.
- » Steady State Replacement

- Change Pdf
  - Reset Links
  - Open Notes
  - Open Bookmarks
  - Fullscreen
- Actions :

### Recombination vs Mutation (2)

- Historical “irrational”:
  - GA emphasize crossover
  - ES and EP emphasize mutation
- Problem-dependent rationale:
  - fitness partially separable?
  - existence of building blocks?
  - Semantically meaningful recombination operator?

**Use recombination if useful!**

### Stopping criterion

- The optimum is reached!
- Limit on CPU resources:
  - Maximum number of fitness evaluations
- Limit on the user’s patience:
  - After some generations without improvement

### Ένας Απλός Γενετικός Αλγόριθμος (1)

- Το Πρόβλημα Βελτιστοποίησης του Μαύρου Κουτιού με τους 5 Διακόπτες.
- Για κάθε συνδυασμό θέσεων των διακοπτών υπάρχει ένα σήμα εξόδου  $f(s)$ , όπου  $s$  είναι ένας συγκεκριμένος συνδυασμός των θέσεων των πέντε διακοπτών.
- Το ζητούμενο του προβλήματος είναι να θέσουμε τους διακόπτες έτσι ώστε να αποκομίσουμε τη μέγιστη δυνατή τιμή της  $f$ .

### Ένας Απλός Γενετικός Αλγόριθμος (2)

- Οι ΓΑ (όπως και γενικότερα οι EA) δεν χρειάζεται να γνωρίζουν τον τρόπο λειτουργίας του μαύρου κουτιού.
- Εκείνο που χρειάζονται είναι:
  - μία μέθοδος κωδικοποίησης και
  - ένας τρόπος αξιολόγησης των κωδικοποιήσεων.
- Με άλλες μεθόδους βελτιστοποίησης είναι πιθανό να δουλεύουμε απευθείας με το σύνολο των παραμέτρων (δηλαδή, τους συνδυασμούς των διακοπτών).
- Με τους ΓΑ, το πρώτο που κάνουμε είναι να κωδικοποιήσουμε τους διακόπτες κις μία συνθετική πεπερασμένη μάκονς

# Ασκήσεις

Exercises - From theory to p x +

localhost:3000/?view=exerciseView

Manjaro Evolearn - Let's ...

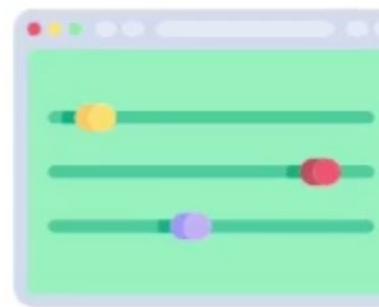
Menu ← : → X

≡

?

# Exercises

Here you can find all sorts of different exercises that let you change their options as well as challenge you with unique goals!



## Exercise 1

Infinite Monkey Theorem

Interact with a version of Infinite Monkey Theorem experiment.

Goals 0/0

Open Exercise



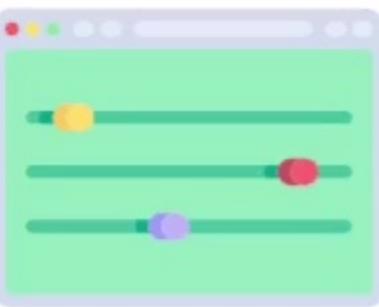
## Exercise 2

Richard Dawkins Weasel

Interact with a version of the Richard Dawkins Weasel experiment.

Goals 0/0

Open Exercise



## Exercise 3

Phenotypes And Genotypes (Discrete)

Time to learn about them in this exercise.

Goals 0/0

Open Exercise



## Exercise 4

Phenotypes And Genotypes (Order Based)

Visualize order based representations with the help of a TSP Visualization.

Goals 0/0

Open Exercise

Infinite Monkey Theorem

localhost:3000/?view=exercise&item=1

Manjaro Evolearn - Let's ...

Menu ⌂ ?

Infinite Monkey Theorem Goals 7 Notes

Iteration: 0

Target:

Type the text that you wish to find  
For instance type : banana

Select what characters you want in the character set

a-z  
 A-Z  
 0 - 9

Select the termination method of the exercise

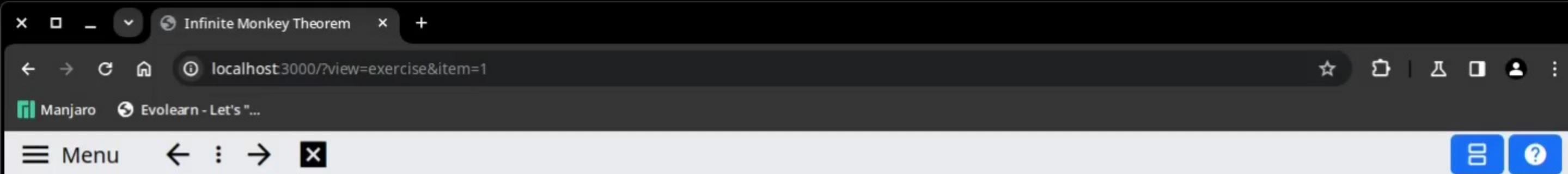
Until the string is found

Select how many string records to keep in the table

None

Iteration Speed Delay : 1000ms

Start ⏪ Stop ⏷ Reset ⏴



Iteration: 0

Target: banana

Iteration

Generated String

Type the text that you wish to find

banana

Select what characters you want in the character set

a-z

A-Z

0 - 9

Select the termination method of the exercise

After a set number of iterations

Iteration Range : 100



Select how many string records to keep in the table

100

Iteration Speed Delay : 200ms



Start

Stop

Reset

Infinite Monkey Theorem

localhost:3000/?view=exercise&item=1

Manjaro Evolearn - Let's ...

Menu ⌂ ?

Infinite Monkey Theorem Goals 6 Notes

Iteration: 7

Target: banana

QoOwlU

Iteration	Generated String
1	bGkxhc
2	zDpBEn
3	zArLHA
4	mDArOE

Type the text that you wish to find  
banana

Select what characters you want in the character set  
 a-z  
 A-Z  
 0 - 9

Select the termination method of the exercise  
After a set number of iterations

Iteration Range : 100

Select how many string records to keep in the table  
100

Iteration Speed Delay : 200ms

Start ▶ Stop □ Reset ⏪

Success 9:41:50 PM X

You completed Goal 1!

Infinite Monkey Theorem

localhost:3000/?view=exercise&item=1

Manjaro Evolearn - Let's ...

Menu ← : → X

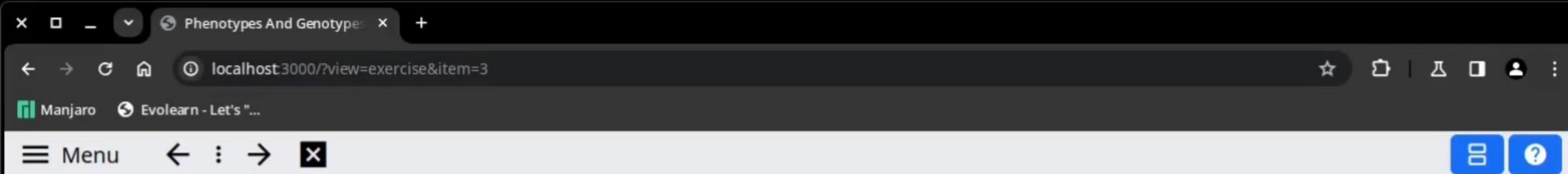
Infinite Monkey Theorem Goals 6 Notes

Goal 1  Sticking to the script  
Use the banana as the exercise instructs

Goal 2  All in!  
Use every single character set all at once

Goal 3  Rebel  
Try to run the exercise with an impossible character set

Goal 4  100s across the board!  
Dial everything to 100...



Phenotypes And Genotypes (Discrete)

Goals 5

Notes

1	1	1	0	0
---	---	---	---	---

$$1*2^4+1*2^3+1*2^2+0*2^1+0*2^0 = 28$$

Select the phenotype representation you want

Integer

Select the size of the genotype : 5

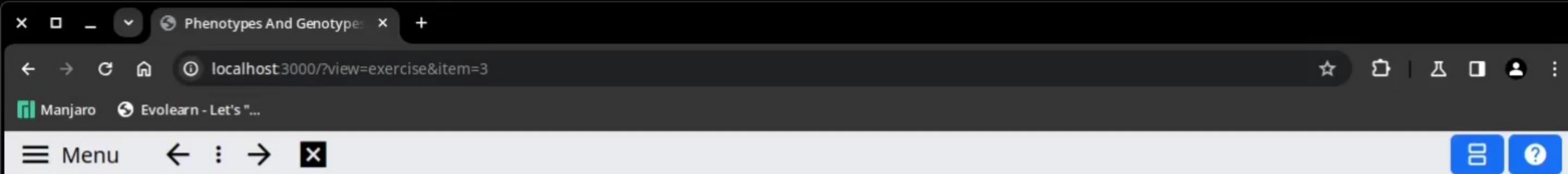


Insert your own genotype or modify the existing one

11100

Generate Genotype

Reset



### Phenotypes And Genotypes (Discrete)

Goals 5

Notes

1	1	1	0	1	1	1	0
0	0	0	1	1	1	0	1
0	0	1	1	1	1	1	

$$\begin{aligned} & 1*2^{21} + 1*2^{20} + 1*2^{19} + 0*2^{18} + 1*2^{17} + 1*2^{16} + 1*2^{15} + 0 \\ & *2^{14} + 0*2^{13} + 0*2^{12} + 0*2^{11} + 1*2^{10} + 1*2^9 + 1*2^8 + 0*2^7 \\ & + 1*2^6 + 0*2^5 + 0*2^4 + 1*2^3 + 1*2^2 + 1*2^1 + 1*2^0 = \\ & 3901263 \end{aligned}$$

Select the phenotype representation you want

Integer

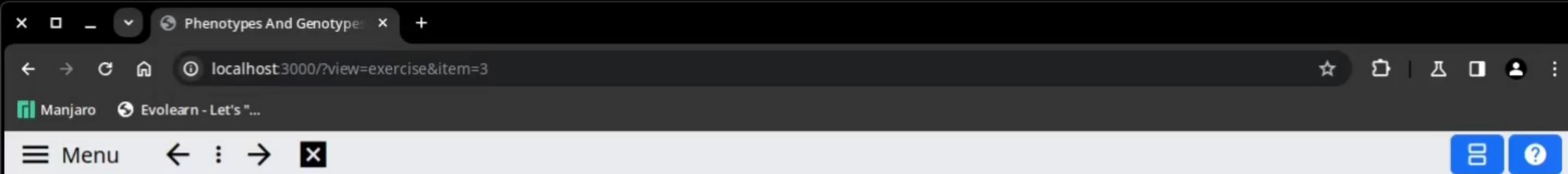
Select the size of the genotype : 22

Insert your own genotype or modify the existing one

1110111000011101001111

Generate Genotype

Reset



Phenotypes And Genotypes (Discrete)

Goals 5

Notes

1	0	1	0	1
---	---	---	---	---

$$1*2^4+0*2^3+1*2^2+0*2^1+1*2^0 = 21$$

Select the phenotype representation you want

Integer

Select the size of the genotype : 5

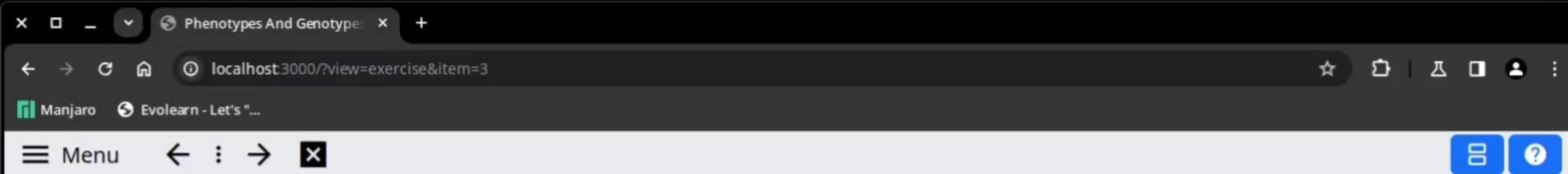


Insert your own genotype or modify the existing one

10101

Generate Genotype

Reset



## Phenotypes And Genotypes (Discrete)

Goals 5

Notes

1	1	0	1	0	1	1	0
0	1	1	1	1	0	0	0
1	1	1					

$$2.5 + (439239/256) * (20.5 - 2.5) = 30886.4921875$$

Select the phenotype representation you want

Real Number

Select the size of the genotype : 19

Insert your own genotype or modify the existing one

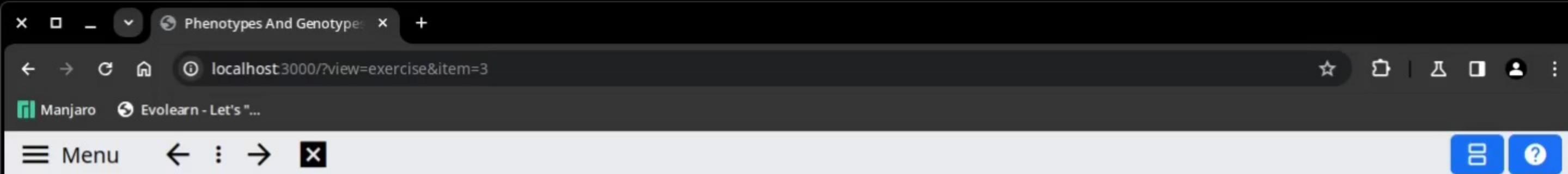
1101011001111000111

Insert phenotype formula (x is the integer conversion of the genotype)

$2.5 + ((x/256) * (20.5 - 2.5))$

Generate Genotype

Reset



## Phenotypes And Genotypes (Discrete)

Goals 5

Notes

1	0	1	0	0	0	1	1
1	0	0	0	1	0	0	0
0 0 0							

$$(334912-2)*400/45+334912 = \\ 3311889.77777778$$

Select the phenotype representation you want

Real Number

Select the size of the genotype : 19

Insert your own genotype or modify the existing one

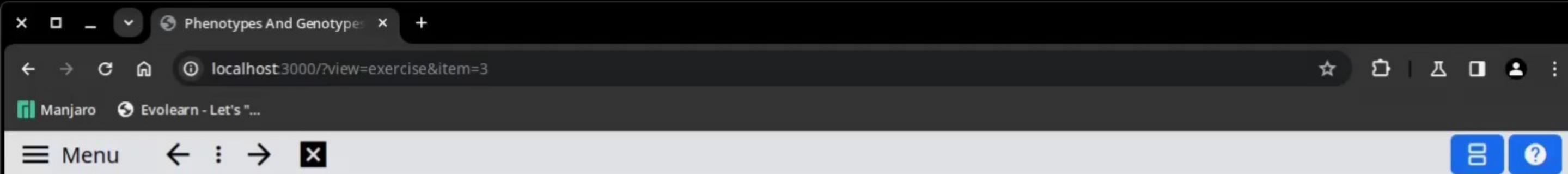
1010001110001000000

Insert phenotype formula (x is the integer conversion of the genotype)

(x-2)\*400/45+x

Generate Genotype

Reset



Phenotypes And Genotypes (Discrete)

Goals 5

Notes

0 1 0 0 0 0 0 0

Job	Time Step
1	1
2	2
3	1
4	1
5	1
6	1
7	1
8	1

Select the phenotype representation you want

Schedule

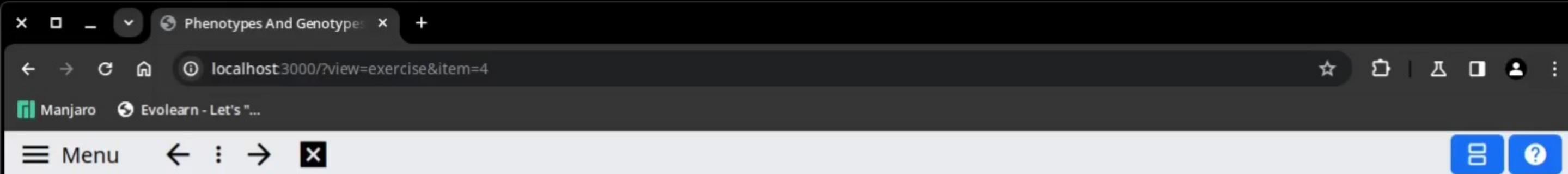
Select the size of the genotype : 8

Insert your own genotype or modify the existing one

01000000

Generate Genotype

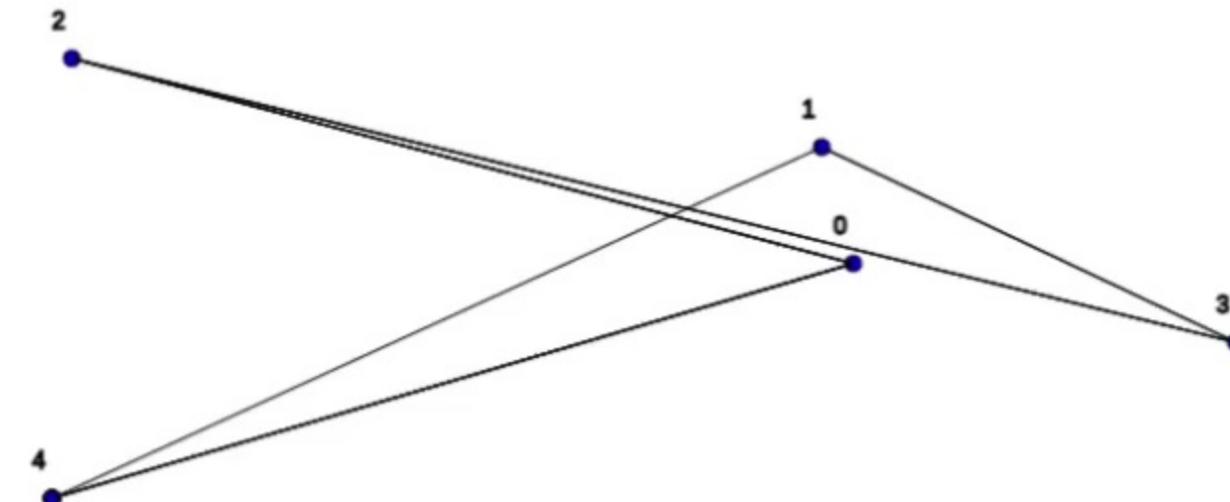
Reset



### Phenotypes And Genotypes (Order Based)

Goals 5

Notes



4	0	2	3	1
---	---	---	---	---

Total path distance : 2100.694

Select the size of the genotype : 5



Insert your own path order as a comma separated list or integers

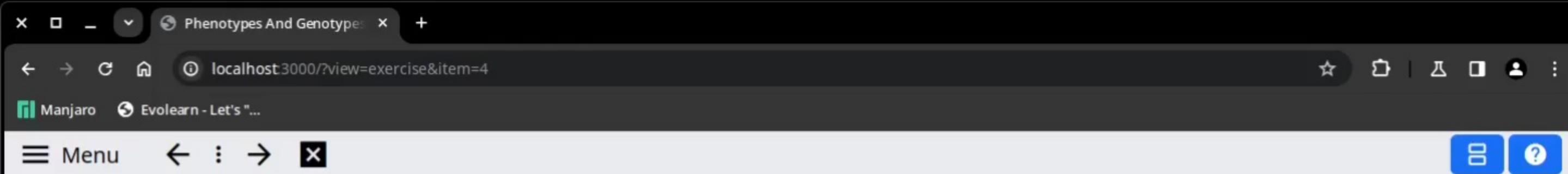
eg. 1,2,0,9,4

New Board

Reset

Clear Path

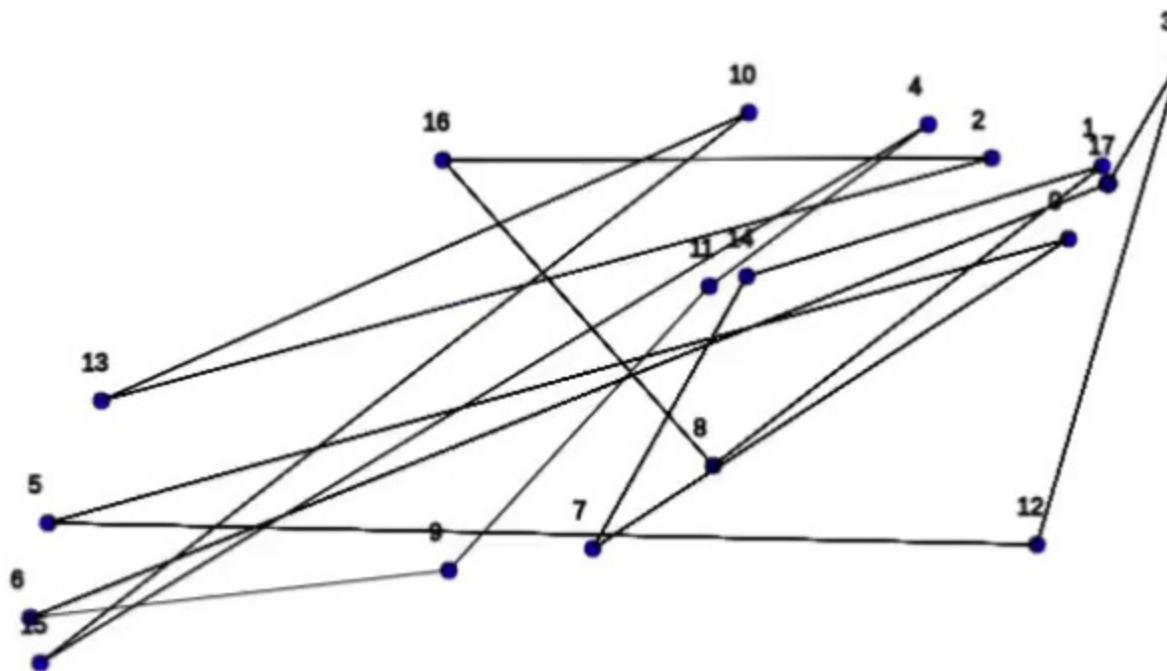
Randomize Path



### Phenotypes And Genotypes (Order Based)

Goals 5

Notes



6	17	3	12	5	0	7	14
1	8	16	2	13	10	15	4
11	9						

Select the size of the genotype : 18

Insert your own path order as a comma separated list or integers

eg. 1,2,0,9,4

New Board

Reset

Clear Path

Randomize Path

Phenotypes And Genotypes x +

localhost:3000/?view=exercise&item=4

Manjaro Evolearn - Let's ...

Menu ← : → X

Phenotypes And Genotypes (Order Based) Goals 5 Notes

Select the size of the genotype : 18

Insert your own path order as a comma separated list or integers

eg. 1,2,0,9,4

New Board Reset

Clear Path Randomize Path

The board contains the following numbered dots:

- Top row: 16, 10, 4, 2, 3
- Middle row: 13, 11, 14, 0, 17
- Bottom row: 5, 8, 7, 12
- Left column: 16, 13, 5, 6, 17, 3, 12, 5, 0, 7, 14, 1, 8, 16, 2, 13, 10, 15, 4, 11, 9.

The numbered boxes below the board are arranged in a 4x4 grid:

6	17	3	12	5	0	7	14
1	8	16	2	13	10	15	4
11	9						

Phenotypes And Genotypes x +

localhost:3000/?view=exercise&item=4

Manjaro Evolearn - Let's ...

Menu ← : → X

Phenotypes And Genotypes (Order Based) Goals 5 Notes

Select the size of the genotype : 18

Insert your own path order as a comma separated list or integers

eg. 1,2,0,9,4

New Board Reset

Clear Path Randomize Path

The board contains the following numbered dots:

- 16 (top left)
- 10 (top center)
- 4 (center)
- 2 (center)
- 3 (top right)
- 17 (center right)
- 1 (center right)
- 0 (center right)
- 11 (middle left)
- 14 (middle left)
- 13 (top left)
- 8 (center left)
- 7 (center left)
- 12 (bottom right)
- 5 (middle left)
- 6 (bottom left)
- 9 (bottom left)
- 17 (bottom left)
- 3 (bottom left)
- 12 (bottom left)
- 5 (bottom left)
- 0 (bottom left)
- 7 (bottom left)
- 14 (bottom left)
- 1 (bottom left)
- 8 (bottom left)
- 16 (bottom left)
- 2 (bottom left)
- 13 (bottom left)
- 10 (bottom left)
- 15 (bottom left)
- 4 (bottom left)
- 11 (bottom left)
- 9 (bottom left)

The numbered boxes below the board are arranged in a 4x4 grid:

6	17	3	12	5	0	7	14
1	8	16	2	13	10	15	4
11	9						

Phenotypes And Genotypes x +

localhost:3000/?view=exercise&item=4

Manjaro Evolearn - Let's ...

Menu ← : → X

Phenotypes And Genotypes (Order Based) Goals 5 Notes

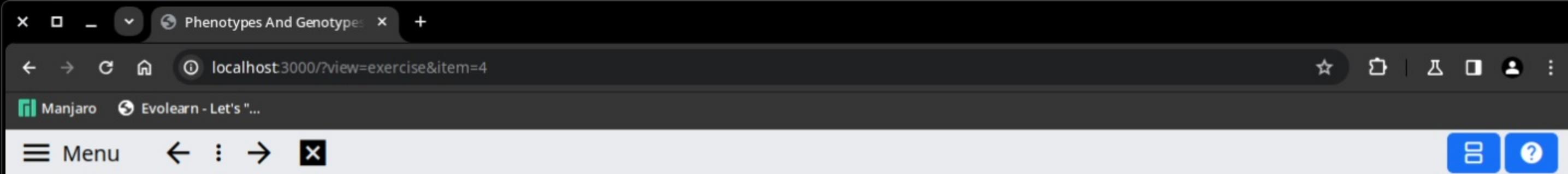
Select the size of the genotype : 18

Insert your own path order as a comma separated list or integers  
eg. 1,2,0,9,4

New Board Reset

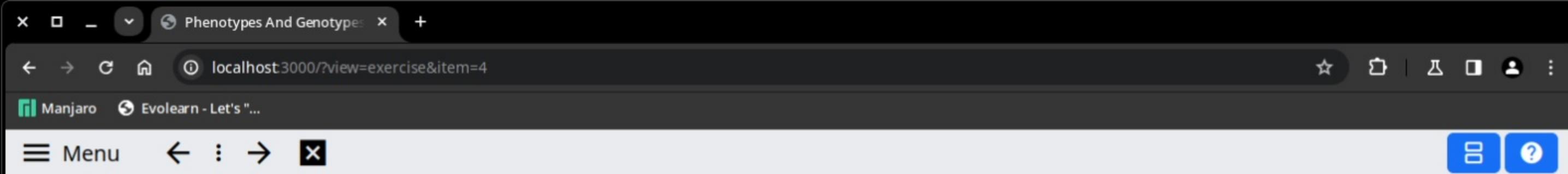
Clear Path Randomize Path

17	8	15	10	16	5	2	9
11	0	4	13	7	3	1	14
12	6						



0    4    1    2    3

Total path distance : 1411.07



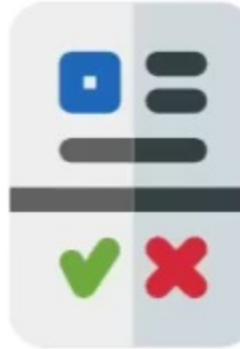
2    1    3    4    0

Total path distance : 1233.478

Kouίζ

# Quizzes

Here you can test all the knowledge that you gathered by answering different types of questions



## Randomly generated Quiz

It selects 10 random questions for you to solve

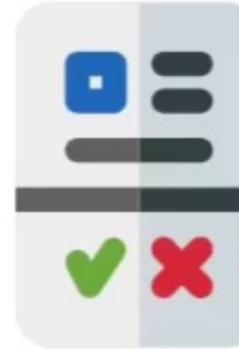
Difficulty : Easy

[Attempt Quiz](#)[Quiz Info](#)[Quiz Stats](#)[Review Quiz](#)

## Quiz 1

This quiz focuses on the evolutionary circle

Difficulty : Normal

[Attempt Quiz](#)[Quiz Info](#)[Quiz Stats](#)[Review Quiz](#)

## Quiz 2

This quiz tests your knowledge of termination criteria

Difficulty : Easy

[Attempt Quiz](#)[Quiz Info](#)[Quiz Stats](#)[Review Quiz](#)

## Quiz 3

This quiz is all about the use of the fitness function

Difficulty : Hard

[Attempt Quiz](#)[Quiz Info](#)[Quiz Stats](#)[Review Quiz](#)

Quiz 1

localhost:3000/?view=quiz&item=1

Manjaro Evolearn - Let's "..."

Menu

Quiz 1

En

Question 1

Which one of these options is correct ?

What is the first step in the evolutionary circle

- Selection
- Mutation
- Recombination

Clear Selections

Check Question

Question 2

Check the correct answer or answers?

Which of these steps are part of the evolutionary cycle?

- Selection
- Recombination
- Exchange

Clear Selections

Check Question

Cancel And Exit

Finish Quiz

Quiz 1

localhost:3000/?view=quiz&item=1

Manjaro Evolearn - Let's ...

Menu

Quiz 1

En

Question 1

Which one of the following is a mutation operator?

What is the first step in the evolutionary cycle?

Selection

Mutation

Recombination

Question 2

Check the correct statement.

Which of these statements is true?

Selection

Recombination

Exchange

Quiz Info

Description : Mix of selection, initialization, evolutionary circle

Difficulty : Normal

Number of questions : 4

Quiz passing score is 30%

Correct answers add 1

Wrong answers subtract -0.5

Are user notifications enabled ? Yes

Are questions randomized ? No

Is user allowed to check answers ? Yes

Is user allowed to reset questions ? Yes

Are hints allowed ? Yes

Score needed to unlock next quiz is 80%

Question ✓

Clear Selections ✕

Check Question ✓

Cancel And Exit ✕

Finish Quiz ✓

X - Quiz 1 +

localhost:3000/?view=quiz&item=1

Manjaro Evolearn - Let's ...

Menu

Question 1

Which one of these options is correct ?

What is the first step in the evolutionary circle

Selection  
 Mutation  
 Recombination

Clear Selections ✕ Check Question ✓

Question 2

Check the correct answer or answers?

Which of these steps are part of the evolutionary cycle?

Selection  
 Recombination  
 Exchange

Clear Selections ✕ Check Question ✓

Cancel And Exit ✕

Finish Quiz ✓

X □ - Quiz 1 +

localhost:3000/?view=quiz&item=1

Manjaro Evolearn - Let's "..."

Menu

Question 1

Which one of these options is correct ?

What is the first step in the evolutionary circle

Selection  
 Mutation  
 Recombination

Clear Selections ✕ Check Question ✓

Question 2

Check the correct answer or answers?

Which of these steps are part of the evolutionary cycle?

Selection  
 Recombination  
 Exchange

Clear Selections ✕ Check Question ✓

Cancel And Exit ✕

Finish Quiz ✓

En

En

E

X □ - Quiz 1 +

localhost:3000/?view=quiz&item=1

Manjaro Evolearn - Let's ...

Menu

Ελ

## Quiz 1

### Ερώτηση 1

Ποία από τις επιλογές είναι σωστή ?

Ποίο είναι το πρώτο βήμα στον εξελικτικό κύκλο

- Επιλογή
- Μετάλλαξη
- Ανασυνδυασμός

Καθαρισμός Επιλογών ✘

Έλεγχος Ερώτησης ✓

### Ερώτηση 2

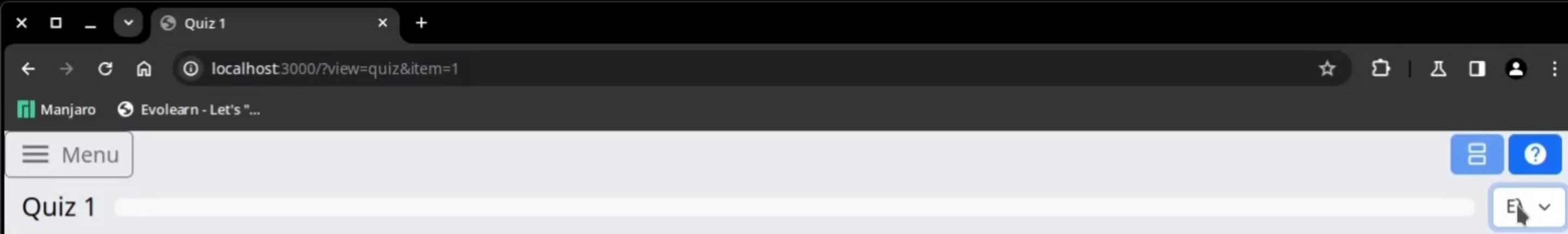
Τσεκάρετε την σωστή ή τις σωστές απαντήσεις

Ποια από αυτά τα βήματα είναι μέρος του εξελικτικού κύκλου ?

- Επιλογή
- Ανασυνδυασμός
- Ανταλλαγή

Καθαρισμός Επιλογών ✘

Έλεγχος Ερώτησης ✓



### Ερώτηση 1

Ποία από τις επιλογές είναι σωστή ?

Ποίο είναι το πρώτο βήμα στον εξελικτικό κύκλο

- Επιλογή
- Μετάλλαξη
- Ανασυνδυασμός

Καθαρισμός Επιλογών

Έλεγχος Ερώτησης

### Ερώτηση 2

Τσεκάρετε την σωστή ή τις σωστές απαντήσεις

Ποια από αυτά τα βήματα είναι μέρος του εξελικτικού κύκλου ?

- Επιλογή
- Ανασυνδυασμός
- Ανταλλαγή

Καθαρισμός Επιλογών

Έλεγχος Ερώτησης

X □ - Quiz 1 +

localhost:3000/?view=quiz&item=1

Manjaro Evolearn - Let's ...

Menu

Ελ ?

Ελ

Ελ

## Quiz 1

### Ερώτηση 1

Ποία από τις επιλογές είναι σωστή ?  
Ποίο είναι το πρώτο βήμα στον εξελικτικό κύκλο

- Επιλογή
- Μετάλλαξη
- Ανασυνδυασμός

Καθαρισμός Επιλογών ✖ Έλεγχος Ερώτησης ✓

### Ερώτηση 2

Τσεκάρετε την σωστή ή τις σωστές απαντήσεις  
Ποια από αυτά τα βήματα είναι μέρος του εξελικτικού κύκλου ?

- Επιλογή
- Ανασυνδυασμός
- Ανταλλαγή

Καθαρισμός Επιλογών ✖ Έλεγχος Ερώτησης ✓

Ακύρωση Κουίζ ✖

Ολοκλήρωση Κουίζ ✓

X - Quiz 1 +

localhost:3000/?view=quiz&item=1

Manjaro Evolearn - Let's "..."

Menu

Question 1

En

Question 1

Which one of these options is correct ?

What is the first step in the evolutionary circle

Selection

Mutation

Recombination

Clear Selections ✕ Check Question ✓

Question 2

Check the correct answer or answers?

Which of these steps are part of the evolutionary cycle?

Selection

Recombination

Exchange

Clear Selections ✕ Check Question ✓

Cancel And Exit ✕

Finish Quiz ✓

X □ - Quiz 1 +

localhost:3000/?view=quiz&item=1

Manjaro Evolearn - Let's ...

Menu

Question 1

En

Question 1 

Which one of these options is correct ?  
What is the first step in the evolutionary circle

Selection  
 Mutation  
 Recombination

A group of people is a...

**Clear Selections ** **Check Question **

Question 2 

Check the correct answer or answers?  
Which of these steps are part of the evolutionary cycle?

Selection  
 Recombination

Cancel And Exit 

Finish Quiz 

Quiz 1

localhost:3000/?view=quiz&item=1

Manjaro Evolearn - Let's ...

Menu

Question 1

En

Question 1

Which one of these options is correct ?

What is the first step in the evolutionary circle

Selection

Mutation

Recombination

A group of people is a...

Clear Selections ✖

Check Question ✓

Question 2

Check the correct answer or answers?

Which of these steps are part of the evolutionary cycle?

Selection

Recombination

Cancel And Exit ✖

Finish Quiz ✓

X - Quiz 1

localhost:3000/?view=quiz&item=1

Manjaro Evolearn - Let's ...

Menu

Question 1

En

Question 1

Which one of these options is correct ?

What is the first step in the evolutionary circle

Selection

Mutation

Recombination

A group of people is a...

Clear Selections ✕

Check Question ✓

Question 2

Check the correct answer or answers?

Which of these steps are part of the evolutionary cycle?

Selection

Recombination

Info 7:14:39 PM X

You need to select an answer before you can check the question

Cancel And Exit

Finish Quiz ✓

Quiz 1

localhost:3000/?view=quiz&item=1

Manjaro Evolearn - Let's ...

Menu

Question 1 25%

En

Question 1

Which one of these options is correct ?

What is the first step in the evolutionary circle

Selection  
 Mutation  
 Recombination

A group of people is a...

Clear Selections ✖ Check Question ✓

Question 2

Check the correct answer or answers?

Which of these steps are part of the evolutionary cycle?

Selection  
 Recombination

Cancel And Exit ✖

Finish Quiz ✓

### Question 3



Is this question False or True ?

Does selection appear before replacement ?

- False
- True

Yes, because the selection of the original members of the population must first take place before they can be replaced with the new ones

Explanation Reference

Clear Selections

Check Question

Question 2



Check the correct answer or answers?

Which of these steps are part of the evolutionary cycle?

- Selection
- Recombination
- Exchange

There is no available explanation for this question

Clear Selections

Check Question

Question 4



Input the correct answer in the input field

What step occurs after recombination?

Type your answer here

Example answer : Selection

There is no available explanation for this question

Clear Selections

Check Question

Quiz 1

localhost:3000/?view=quiz&item=1

Manjaro Evolearn - Let's ...

Menu

75%

En

Yes, because the selection of the original members of the population must first take place before they can be replaced with the new ones

Explanation Reference

Clear Selections ✕ Check Question ✓

Question 4

Input the correct answer in the input field

What step occurs after recombination?

Example answer :  
mutation

Example answer : Selection

Clear Selections ✕ Check Question ✓

Cancel And Exit ✕

Finish Quiz ✓

X - Quiz 1

localhost:3000/?view=quiz&item=1

Manjaro Evolearn - Let's ...

Menu

Quiz 1 75%

En

Yes, because the selection of the original members of the population must first take place before they can be replaced with the new ones  
Explanation Reference

Do you want to finish the quiz ?

You seem to have some unanswered questions.  
Are you sure you want to finish with the quiz ?

Question ✓

Question 4

Input the cor...  
What step occurs...

Example answer :  
mutation

Example answer : Selection

Clear Selections ✖ Check Question ✓

Cancel And Exit ✖

Finish Quiz ✓

X - Quiz 1

localhost:3000/?view=quiz&item=1

Manjaro Evolearn - Let's "..."

Menu

Quiz 1 100%

En

Which one of these options is correct ?

What is the first step in the evolutionary circle

Selection  
 Mutation  
 Recombination

A group of people

Do you want to finish the quiz ?

Are you sure you want finish this quiz ?  
You wont be able to change the answers you have given.

Question ✓

Yes ✓

Question 2

Check the correct answer or answers?

Which of these steps are part of the evolutionary cycle?

Selection  
 Recombination  
 Exchange

Cancel And Exit

Finish Quiz ✓

Quiz 1

localhost:3000/?view=quiz&item=1

Manjaro Evolearn - Let's "..."

Menu

Quiz 1 100% En

Which one of these options is correct ?

What is the first step in the evolutionary circle

Selection  
 Mutation  
 Recombination

A group of people is a...

Clear Selections ✕ Check Question ✓

Question 2

Check the correct answer or answers?

Which of these steps are part of the evolutionary cycle?

Selection  
 Recombination  
 Exchange

Cancel And Exit ✕ Finish Quiz ✓

X - Quiz 1

localhost:3000/?view=quiz&item=1

Manjaro Evolearn - Let's ...

Menu

Quiz 1 100%

En

Which one of these options is correct ?

What is the first step in the evolutionary circle

Selection  
 Mutation  
 Recombination

A group of people

Are you sure you want to Exit ?

Any progress on the quiz will be lost.  
You can not undo this action.

Question ✓

Yes ✓

Question 2

Check the correct answer or answers?

Which of these steps are part of the evolutionary cycle?

Selection  
 Recombination  
 Exchange

Cancel And Exit

Finish Quiz ✓

Quiz 1

localhost:3000/?view=quiz&item=1

Manjaro Evolearn - Let's ...

Menu ← : → X

Final Result X

Which one of the following is a mutation?

What is the first step in the life cycle of a bacterium?

Selection  
Mutation  
Recombination

A group of people who have the same trait are called:

There is no available answer.

Question 2

Check the correct answer.

Which of these statements is true about DNA?

Selection

Final Result

You did Bad on this quiz and Passed!

Final score is 37.5%

You had 2 correct questions

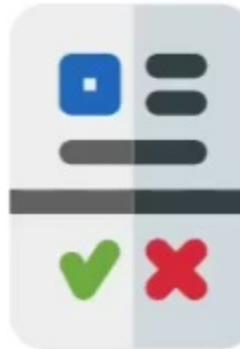
1 wrong question

and 1 unanswered question

Sometimes you get attempts like those. Don't give up!

# Quizzes

Here you can test all the knowledge that you gathered by answering different types of questions



## Randomly generated Quiz

It selects 10 random questions for you to solve

Difficulty : Easy

[Attempt Quiz](#)[Quiz Info](#)[Quiz Stats](#)[Review Quiz](#)

## Quiz 1

This quiz focuses on the evolutionary circle

Difficulty : Normal

[Attempt Quiz](#)[Quiz Info](#)[Quiz Stats](#)[Review Quiz](#)

## Quiz 2

This quiz tests your knowledge of termination criteria

Difficulty : Easy

[Attempt Quiz](#)[Quiz Info](#)[Quiz Stats](#)[Review Quiz](#)

## Quiz 3

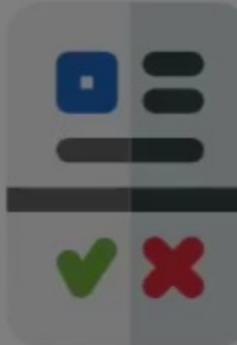
This quiz is all about the use of the fitness function

Difficulty : Hard

[Attempt Quiz](#)[Quiz Info](#)[Quiz Stats](#)[Review Quiz](#)

# Quizzes

Here you  
by



## Randomly generated Quiz

It selects 10 random questions for  
you to solve

Difficulty : Easy

[Attempt Quiz](#)[Quiz Info](#)[Quiz Stats](#)[Review Quiz](#)

## Quiz 1

This quiz f  
circle

Difficulty :

### Quiz Info



Description : Mix of selection, initialization, evolutionary circle  
Difficulty : Normal  
Number of questions : 4  
Quiz passing score is 30%  
Correct answers add 1  
Wrong answers subtract -0.5  
Are user notifications enabled ? Yes  
Are questions randomized ? No  
Is user allowed to check answers ? Yes  
Is user allowed to reset questions ? Yes  
Are hints allowed ? Yes  
Score needed to unlock next quiz is 80%

[Quiz Stats](#)[Review Quiz](#)

## Quiz 3

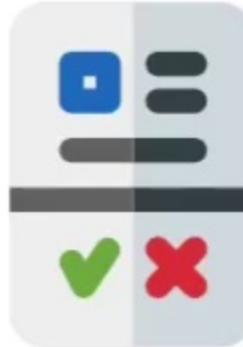
This quiz is all about the use of the  
fitness function

Difficulty : Hard

[Attempt Quiz](#)[Quiz Info](#)[Quiz Stats](#)[Review Quiz](#)

# Quizzes

Here you can test all the knowledge that you gathered by answering different types of questions



## Randomly generated Quiz

It selects 10 random questions for you to solve

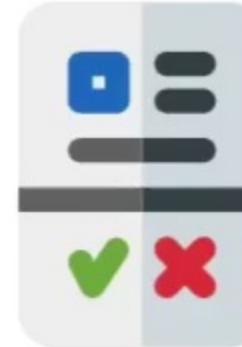
Difficulty : Easy

[Attempt Quiz](#)[Quiz Info](#)[Quiz Stats](#)[Review Quiz](#)

## Quiz 1

This quiz focuses on the evolutionary circle

Difficulty : Normal

[Attempt Quiz](#)[Quiz Info](#)[Quiz Stats](#)[Review Quiz](#)

## Quiz 2

This quiz tests your knowledge of termination criteria

Difficulty : Easy

[Attempt Quiz](#)[Quiz Info](#)[Quiz Stats](#)[Review Quiz](#)

## Quiz 3

This quiz is all about the use of the fitness function

Difficulty : Hard

[Attempt Quiz](#)[Quiz Info](#)[Quiz Stats](#)[Review Quiz](#)

Quizzes - Time to test what

localhost:3000/?view=quizView

Manjaro Evolearn - Let's ...

Menu

Here you by

Randomly generated Quiz

It selects 10 random questions for you to solve

Difficulty : Easy

Attempt Quiz

Quiz Info

Quiz Stats

Review Quiz

Quiz 1

This quiz f circle

Difficulty :

Quiz Score Progression

Score Percent

Attempt Number

Passed attempts : 6

Failed attempts : 2

Canceled attempts : 3

Average Score : 39.06%

Quiz 3

This quiz is all about the use of the fitness function

Difficulty : Hard

Attempt Quiz

Quiz Info

Quiz Stats

Review Quiz

Quiz Stats

Passed attempts : 6

Failed attempts : 2

Canceled attempts : 3

Average Score : 39.06%

Quiz Score Progression

Score Percent

Attempt Number

1 2 3 4 5 6 7 8

25 37.5 75 37.5 37.5 37.5 62.5 37.5

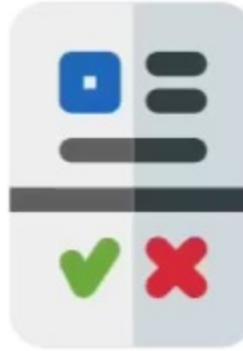
Atmosphere

gathered

ns

# Quizzes

Here you can test all the knowledge that you gathered by answering different types of questions



## Randomly generated Quiz

It selects 10 random questions for you to solve

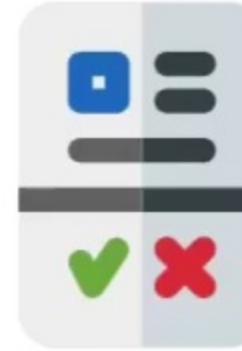
Difficulty : Easy

[Attempt Quiz](#)[Quiz Info](#)[Quiz Stats](#)[Review Quiz](#)

## Quiz 1

This quiz focuses on the evolutionary circle

Difficulty : Normal

[Attempt Quiz](#)[Quiz Info](#)[Quiz Stats](#)[Review Quiz](#)

## Quiz 2

This quiz tests your knowledge of termination criteria

Difficulty : Easy

[Attempt Quiz](#)[Quiz Info](#)[Quiz Stats](#)[Review Quiz](#)

## Quiz 3

This quiz is all about the use of the fitness function

Difficulty : Hard

[Attempt Quiz](#)[Quiz Info](#)[Quiz Stats](#)[Review Quiz](#)

Quiz 1

localhost:3000/?view=quiz&item=1

Manjaro Evolearn - Let's ...

Menu ← : → X

Quiz 1 En

Question 1

Which one of these options is correct ?

What is the first step in the evolutionary circle

Selection  
 Mutation  
 Recombination

A group of people is a...

There is no available explanation for this question

Question 2

Check the correct answer or answers?

Which of these steps are part of the evolutionary cycle?

Quiz 1

localhost:3000/?view=quiz&item=1

Manjaro Evolearn - Let's ...

Menu ← : → X

Quiz 1

En

Question 3

Is this question False or True ?

Does selection appear before replacement ?

False

True

Think about the order that a population's steps should take

Yes, because the selection of the original members of the population must first take place before they can be replaced with the new ones

Explanation Reference

Question 4

Quiz 1

localhost:3000/?view=quiz&item=1

Manjaro Evolearn - Let's ...

Menu ← : → X

Explanation Reference

Question 4

Input the correct answer in the input field

What step occurs after recombination?

Type your answer here  
Mutation

Example answer : Selection

What happens to genes some times...

There is no available explanation for this question

Quiz 1

localhost:3000/?view=quiz&item=1

Manjaro Evolearn - Let's ...

Menu ← : → X

Quiz 1

En

Does selection appear before replacement ?

False

True

Think about the order that a population's steps should take

Yes, because the selection of the original members of the population must first take place before they can be replaced with the new ones

Explanation Reference

Question 4

Input the correct answer in the input field

What step occurs after recombination?

Type your answer here

Mutation

Introduction

localhost:3000/?view=pdf&item=1&page=3

Manjaro EvoLearn - Let's ...

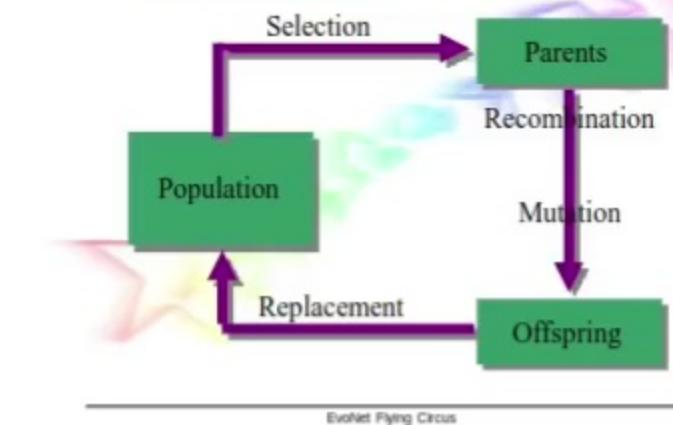
Menu

3 of 6

Automatic Zoom

Actions :

## The Evolutionary Cycle



## Pseudocode

```
generation = 0;  
SeedPopulation(popSize); // at random or from a file  
while(!TerminationCondition())  
{  
    generation = generation + 1;  
    CalculateFitness(); // ... of new genotypes  
    Selection(); // select genotypes that will reproduce  
    Crossover( $p_{cross}$ ); // mate  $p_{cross}$  of them on average  
    Mutation( $p_{mut}$ ); // mutate all the offspring with Bernoulli  
    // probability  $p_{mut}$  over genes  
}
```

## Evolution Programs

Slogan:

Genetic Algorithms + Data Structures = Evolution Programs

Key ideas:

- use a data structure as close as possible to object

## Object problem and Fitness



X - Quiz 1 +

localhost:3000/?view=quiz&item=1

Manjaro Evolearn - Let's ...

Menu

Quiz 1 En Time Remaining -- 01 : 51

Question 1

Which one of these options is correct ?

What is the first step in the evolutionary circle

Selection

Mutation

Recombination

Question 2

Check the correct answer or answers?

Which of these steps are part of the evolutionary cycle?

Selection

Recombination

Exchange

Cancel And Exit

1 2

Finish Quiz ✓

X - Quiz 1 +

localhost:3000/?view=quiz&item=1

Manjaro Evolearn - Let's ...

Menu

Quiz 1 100% En Time Remaining -- 00 : 58

Question 3

Is this question False or True ?

Does selection appear before replacement ?

False

True

Question 4

Input the correct answer in the input field

What step occurs after recombination?

Type your answer here  
mutation

Example answer : Selection

i Info 8:22:58 PM Half of the available time has elapsed

A Warning 8:22:59 PM You have one minute remaining

Cancel And Exit

1 2

Finish Quiz

## Final Result



You did Good on this quiz and Passed!

Final score is 62.5%

You had 3 correct questions

1 wrong question

and 0 unanswered questions

Nice work

Keep it up.

## Question 3

Is this question

Does selection ap

- False  
 True

Yes, because th  
before they ca  
Explanation Re

## Question 4

Input the cor

What step occurs

Type your answer

X - Quiz 1 +

localhost:3000/?view=quiz&item=1

Manjaro Evolearn - Let's "..."

Menu

Quiz 1

En

Question 1

← Previous Next →

Which one of these options is correct ?

What is the first step in the evolutionary circle

Selection

Mutation

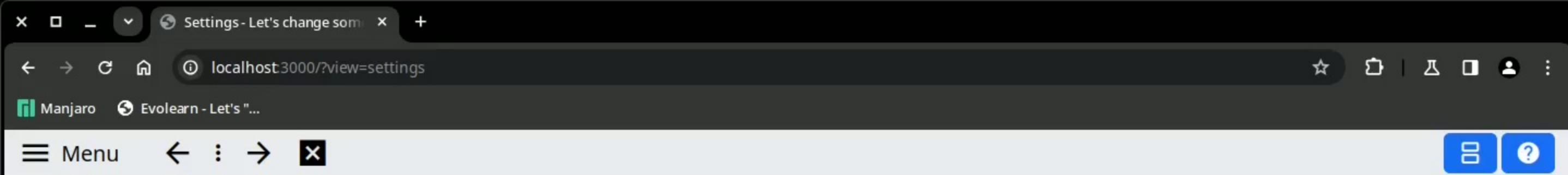
Recombination

Clear Selections ✕ Check Question ✓

Cancel And Exit ✕

Finish Quiz ✓

Ρυθμίσεις



# Settings

## Application Theme

You can choose between light or dark theme, depending on your preference.

Light Theme



## Volume Control

You can change the volume level, or mute the sound entirely.



Play Test Sound

Mute Volume ?

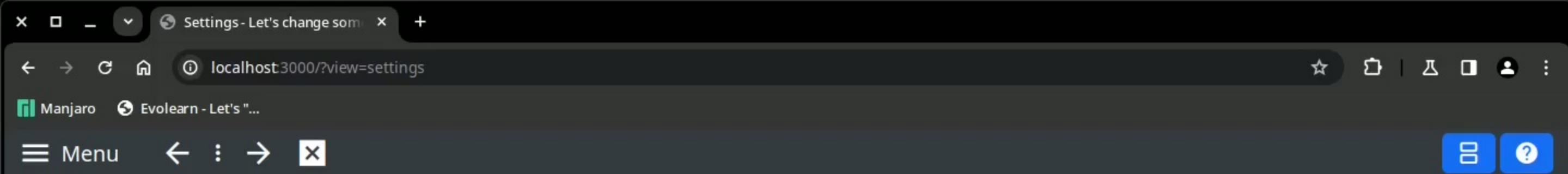


## Editor AutoSave

You can enable/disable global autosave for the note editor.

This setting can be overwritten temporarily by clicking on the autosave button in the editor.





# Settings

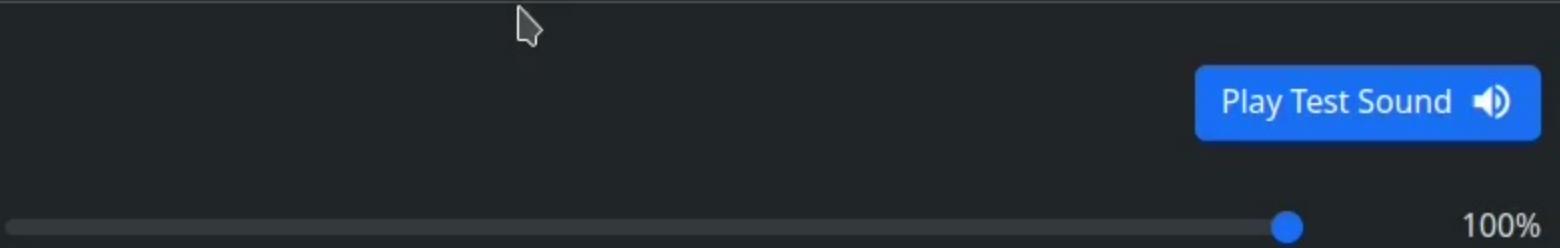
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Dark Theme

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Mute Volume ?



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Settings - Let's change som... +

localhost:3000/?view=settings

Manjaro Evolearn - Let's ...

Menu ⌘ ⌘ ⌘ ⌘ ⌘

You can choose between light or dark theme, depending on your preference.

Dark Theme

Volume Control

You can change the volume level, or mute the sound entirely.

Play Test Sound 🔊

89%

Mute Volume ?

Editor AutoSave

You can enable/disable global autosave for the note editor.

This setting can be overwritten temporarily by clicking on the autosave button in the editor.

Teacher Notes

You can show/hide the notes included in the study material and the exercises.

Make sure to check them frequently for any changes.

Do Not Disturb Mode

Settings - Let's change some things

localhost:3000/?view=settings

Manjaro Evolearn - Let's ...

Menu ⌂ ⌄ ⌁ ⌂ ⌃

You can choose between light or dark theme, depending on your preference.

Dark Theme

Volume Control

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Play Test Sound 🔊

89%

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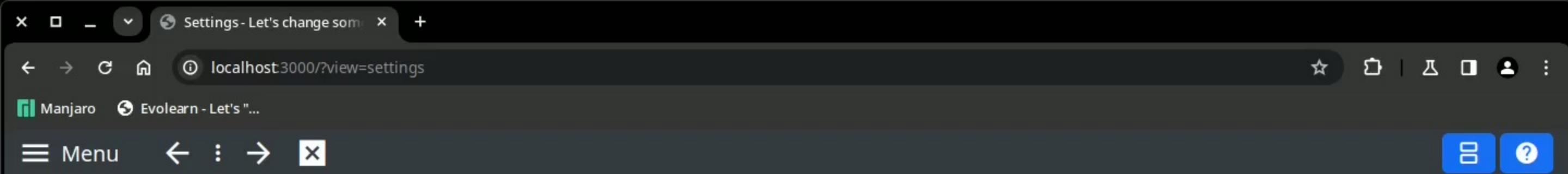
Teacher Notes

You can show/hide the notes included in the study material and the exercises.

Make sure to check them frequently for any changes.

Do Not Disturb Mode

Star | Full Screen | Minimize | Maximize | Close | Help | User

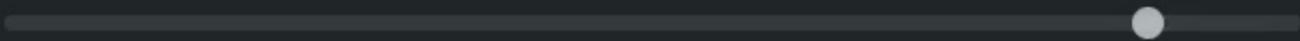


You can choose between light or dark theme, depending on your preference.

Dark Theme

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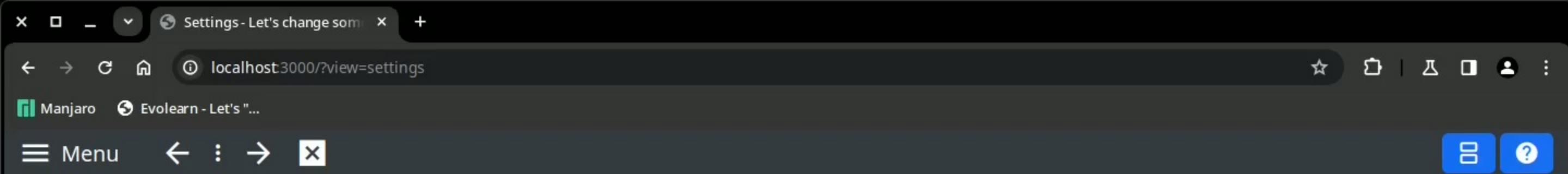
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Make sure to check them frequently for any changes.



## Do Not Disturb Mode



You can decide whether or not to display the teacher notifications the moment they are send.

If you enable this mode of operation, the menu notifications item will show you how many you have missed.



## Offline Support Mode

[Restart Application](#)

You can enable/disable the applications ability to function offline.

The way that it works is by saving every file that you access while using the application in a local cache database.

None of those files are ever sent to any outside party, they are strictly stored locally.

It is recommended to refresh to cache all the initial files, so that you will be able to at least open the main page of the application.



When you are offline, the application will switch to using the cached files (parts of the application will not work if not cached).

Every time you disable this setting, you also delete all the stored files in the cache.

## Application Modals

[Open test modal](#)

You can choose how the modal backdrop behaves.

- Enabled - You are able to dismiss a modal by clicking outside of it
- Disabled - Backdrop is invisible
- Static - You are not able to dismiss a modal by clicking outside of it

Enabled



Enable the ability to dismiss modals using the ESC key ?



Manjaro Evolearn - Let's ...

☰ Menu ← : → ✕



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[Restart Application](#) ⚡

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## Application Modals

[Open test modal](#) ✎

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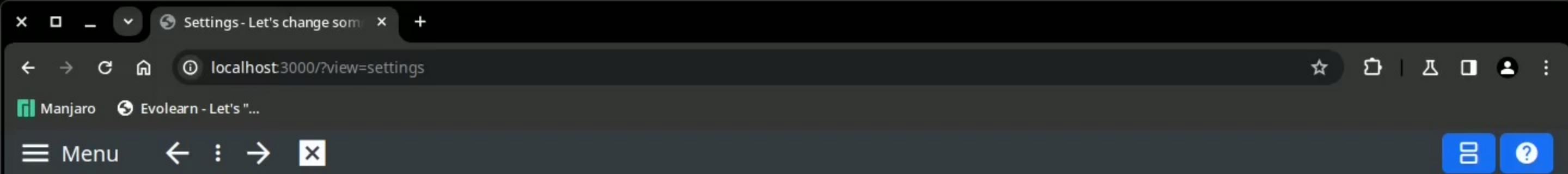
- Enabled - You are able to dismiss a modal by clicking outside of it
- Disabled - Backdrop is invisible
- Static - You are not able to dismiss a modal by clicking outside of it

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Enabled



Enable the ability to dismiss modals using the ESC key ?



Settings - Let's change som... +

localhost:3000/?view=settings

Manjaro Evolearn - Let's "...

Menu ← : → X

None of those files are ever sent to any outside party, they are strictly stored locally.

It is recommended to refresh to cache all the initial files, so that you will be able to at least open the main page of the application.

When you are offline, the application will switch to using the cached files (parts of the application will not work if not cached).

Every time you disable this setting, you also delete all the stored files in the cache.

Open test modal

## Application Modals

You can choose how the modal backdrop behaves.

- Enabled - You are able to dismiss a modal by clicking the backdrop
- Disabled - Backdrop is invisible
- Static - You are not able to dismiss a modal by clicking the backdrop

Enable the ability to dismiss modals using the ESC key ?

Test Modal X

This is a test.

...and this is a footer!

Open test toast

## Application Toasts

Enable the fade in toast animation ?

Enable the toast auto-hide feature ?

Select how long to keep toast visible in milliseconds.

2500ms

Settings - Let's change som x +

localhost:3000/?view=settings

Manjaro Evolearn - Let's "..."

Menu ← : → X

None of those files are ever sent to any outside party, they are strictly stored locally.

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---

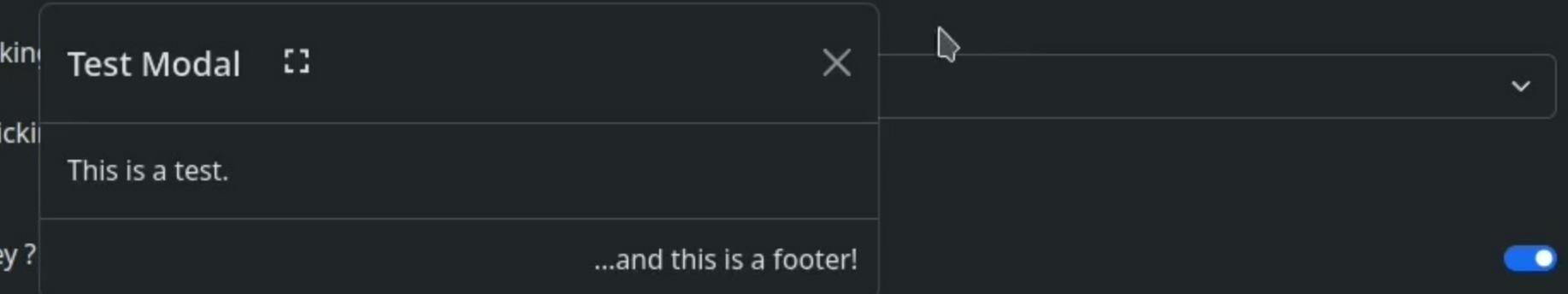
## Application Modals

Open test modal 

You can choose how the modal backdrop behaves.

- Enabled - You are able to dismiss a modal by clicking the backdrop.
- Disabled - Backdrop is invisible
- Static - You are not able to dismiss a modal by clicking the backdrop.

Enable the ability to dismiss modals using the ESC key ?



A screenshot of a modal dialog titled "Test Modal". The dialog contains the text "This is a test." and "...and this is a footer!". A close button (X) is visible in the top right corner, and a small arrow cursor is pointing towards it.

---

## Application Toasts

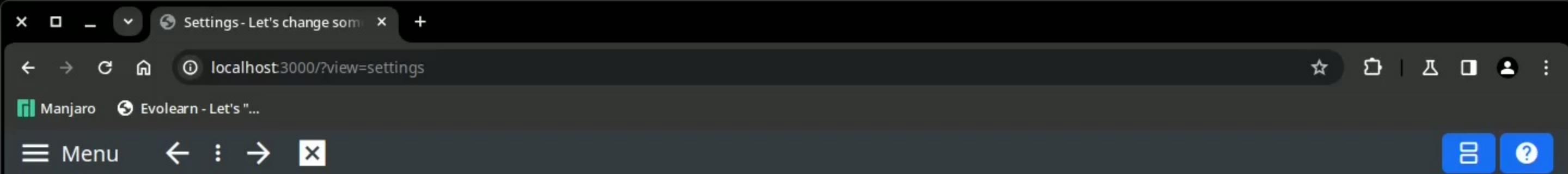
Open test toast 

Enable the fade in toast animation ?

Enable the toast auto-hide feature ?

Select how long to keep toast visible in milliseconds.

2500ms



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Static

Enable the ability to dismiss modals using the ESC key ?



## Application Toasts

[Open test toast](#)

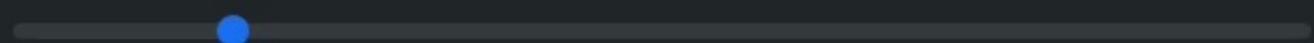
Enable the fade in toast animation ?



Enable the toast auto-hide feature ?



Select how long to keep toast visible in milliseconds.



2500ms

Settings - Let's change som... +

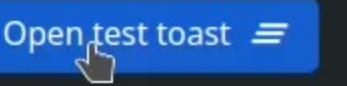
localhost:3000/?view=settings

Manjaro Evolearn - Let's "...

Menu ⌘ ⌘ ⌘ ⌘ ⌘

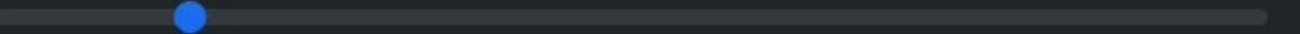
Enable the ability to dismiss modals using the ESC key ?

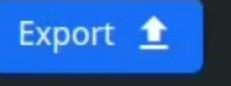
**Application Toasts**

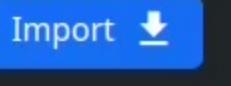
Open test toast 

Enable the fade in toast animation ?

Enable the toast auto-hide feature ?

Select how long to keep toast visible in milliseconds.  2500ms

**Export Application Data** 

**Import Application Data** 

**Delete Application Data** 

Settings - Let's change som... +

localhost:3000/?view=settings

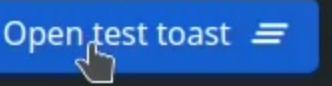
Manjaro Evolearn - Let's "...

Menu ⌂ ⌂ ?

Enable the ability to dismiss modals using the ESC key ?

---

## Application Toasts

Open test toast 

Enable the fade in toast animation ?

Enable the toast auto-hide feature ?

Select how long to keep toast visible in milliseconds.  2500ms

---

## Export Application Data

Export 

---

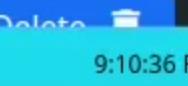
## Import Application Data

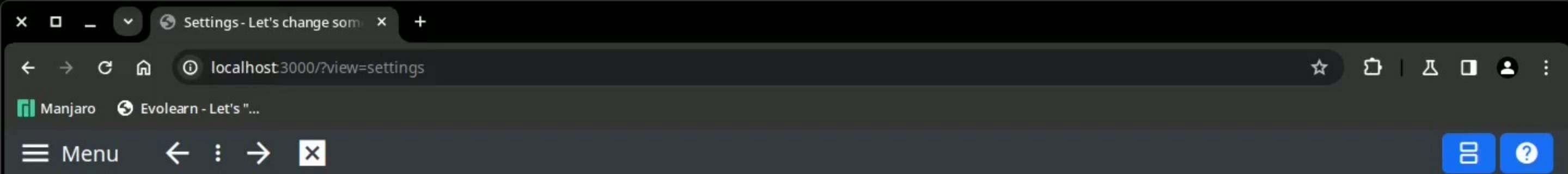
Import 

---

## Delete Application Data

 Info 9:10:36 PM X

This is a test 



Enable the ability to dismiss modals using the ESC key ?

## Application Toasts

Open test toast 

Enable the fade in toast animation ?

Enable the toast auto-hide feature ?

Select how long to keep toast visible in milliseconds.



600ms

## Export Application Data

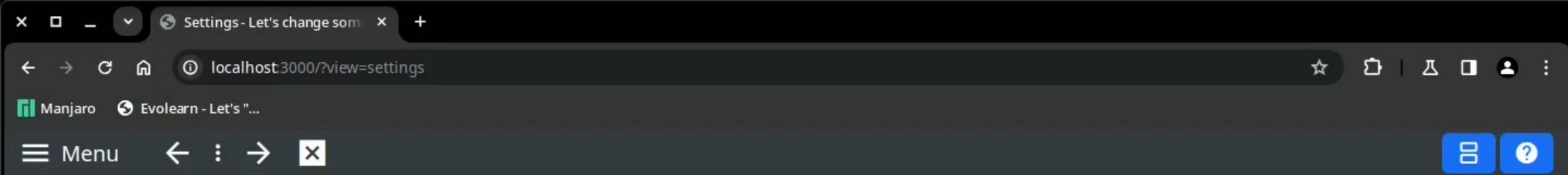
 Export 

## Import Application Data

Import 

## Delete Application Data

Delete 



Enable the ability to dismiss modals using the ESC key ?



## Application Toasts

Open test toast 

Enable the fade in toast animation ?



Enable the toast auto-hide feature ?



Select how long to keep toast visible in milliseconds.



600ms

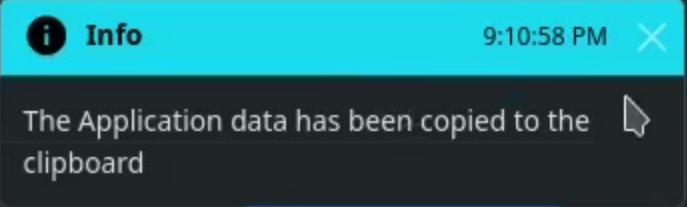
## Export Application Data

Export 

## Import Application Data

Import 

## Delete Application Data



Settings - Let's change som... +

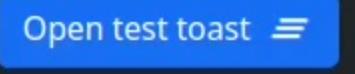
localhost:3000/?view=settings

Manjaro Evolearn - Let's ...

Menu ⌘ ⌘ ⌘ ⌘ ⌘

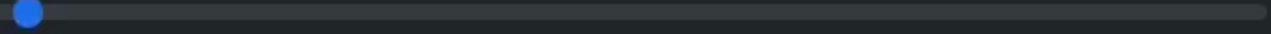
Enable the ability to dismiss modals using the ESC key ?

**Application Toasts**

Open test toast 

Enable the fade in toast animation ?

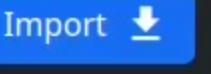
Enable the toast auto-hide feature ?  

Select how long to keep toast visible in milliseconds.  600ms

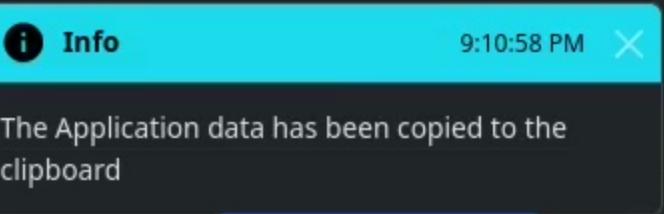
**Export Application Data**

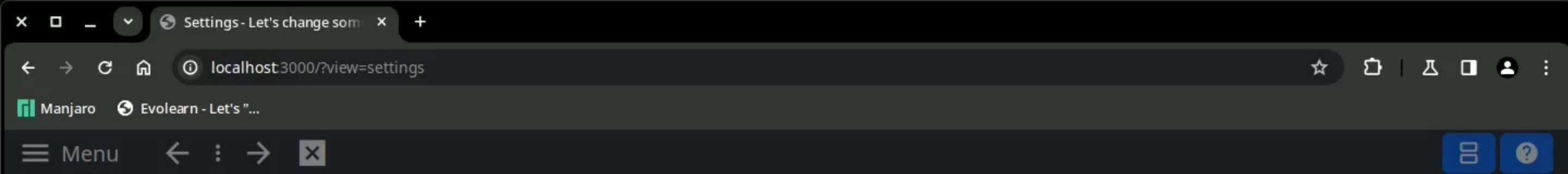
Export 

**Import Application Data**

Import 

**Delete Application Data**

 Info 9:10:58 PM X  
The Application data has been copied to the clipboard



Enable the ability to dismiss modals using the ESC key ?



## Application Toasts

Enable the fade in toast animation ?



Enable the toast auto-hide feature ?



Select how long to keep toast visible in milliseconds.

600ms

## Export Application Data

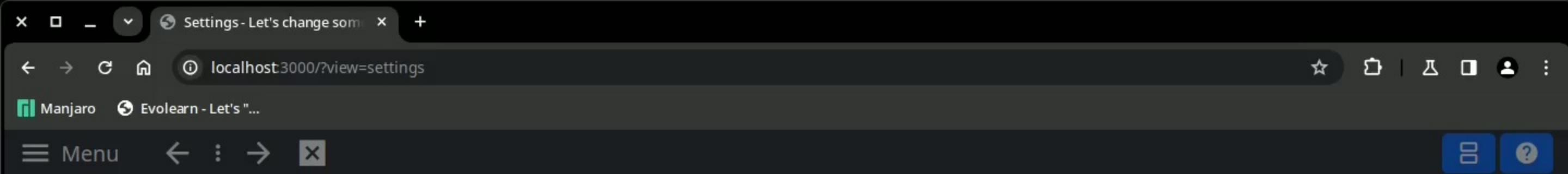
Export

## Import Application Data

Import

## Delete Application Data

Delete



## Application Toasts

Enable the fade in toast animation ?

Enable the toast auto-hide feature ?

Select how long to keep toast visible in milliseconds.

## Export Application Data

## Import Application Data

## Delete Application Data

### Import Settings

```
{"id": "_3", "lockedState": 1},  
{"id": "_4", "lockedState": 0}], "EditorSettings": "  
{"autosave": false}, "UserQuizzesLockedState": "  
[], "ModalSettings": "  
{"backdrop": "static", "keyboard": false, "focus": true}, "UserExercisesLockedState": "  
[], "LatestNotificationHash": -47899207, "ServiceWorkerState": "false", "UnseenNotifications": [], "AudioSettings": "  
{"muteStatus": true, "volumeNumber": "0.89"}, "QuizOverride": "false"}
```

Import

Open test toast

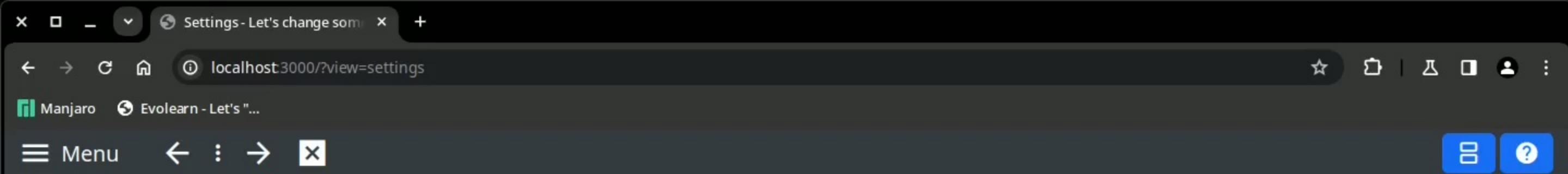


600ms

Export

Import

Delete



Enable the ability to dismiss modals using the ESC key ?



## Application Toasts

Open test toast 

Enable the fade in toast animation ?



Enable the toast auto-hide feature ?



Select how long to keep toast visible in milliseconds.



600ms

## Export Application Data

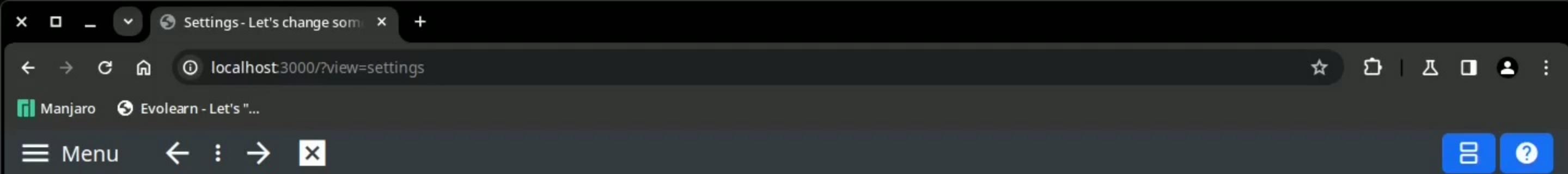
Export 

## Import Application Data

Import 

## Delete Application Data

Delete 



## Application Toasts

[Open test toast](#)

Enable the fade in toast animation ?



Enable the toast auto-hide feature ?



Select how long to keep toast visible in milliseconds.



600ms

## Export Application Data

[Export](#)

## Import Application Data

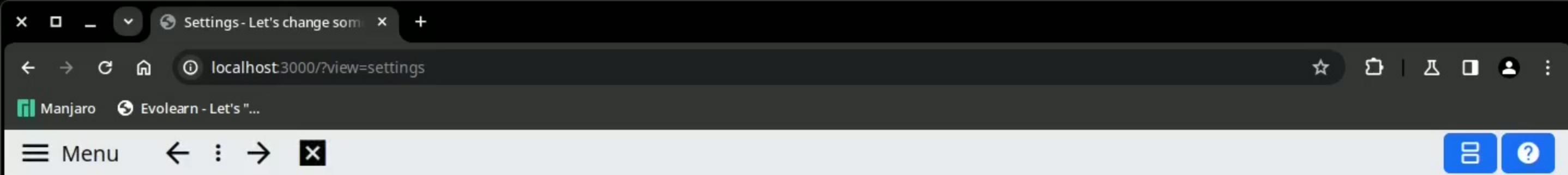
[Import](#)

## Delete Application Data

[Delete](#)

## Reset Settings To Default

[Reset Settings](#)



## Application Toasts

[Open test toast](#)

Enable the fade in toast animation ?



Enable the toast auto-hide feature ?



Select how long to keep toast visible in milliseconds.



2500ms

## Export Application Data

[Export](#)

## Import Application Data

[Import](#)

## Delete Application Data

[Delete](#)

## Reset Settings To Default

[Reset Settings](#)

Settings - Let's change som... x +

localhost:3000/?view=settings

Manjaro Evolearn - Let's "...

Menu ⌂ ⌄ ⌅ ⌆ ⌁ ⌂ ?

## Application Toasts

Enable the fade in toast animation ?

Enable the toast auto-hide feature ?

Select how long to keep toast visible in milliseconds.  2500ms

---

## Export Application Data

Export 

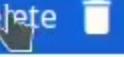
---

## Import Application Data

Import 

---

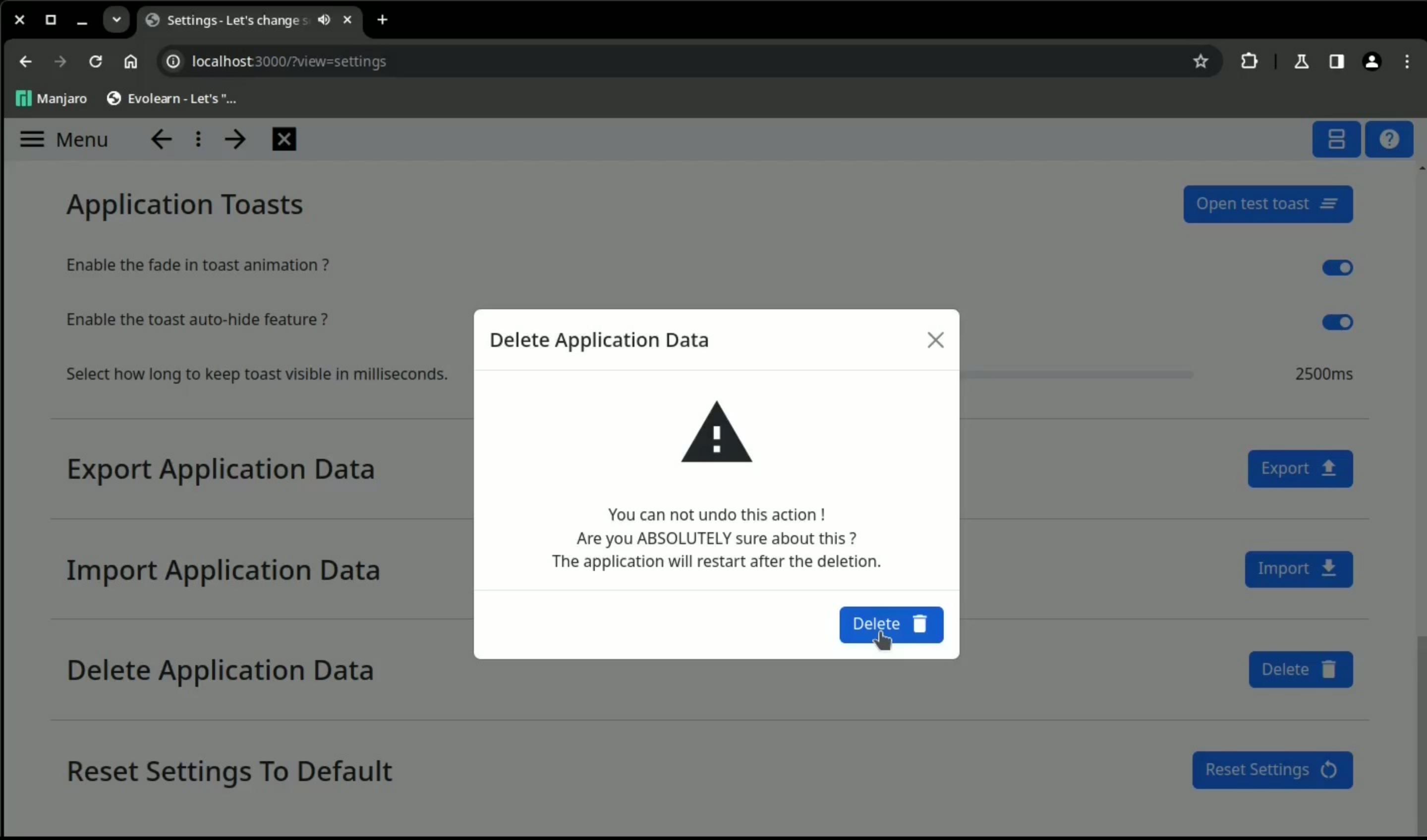
## Delete Application Data

Delete 

---

## Reset Settings To Default

Reset Settings 



**Ειδοποιήσεις**

Notifications - All the news

localhost:3000/?view=notifications

Manjaro Evolearn - Let's ...

Menu

Change in the study material 2/5/2024 1:25:49 PM

I have added two new documents that I would like you to take a look at.

Delete Notification

Informational Video 2/5/2024 1:24:14 PM

I would really like all of you to take look at the following video



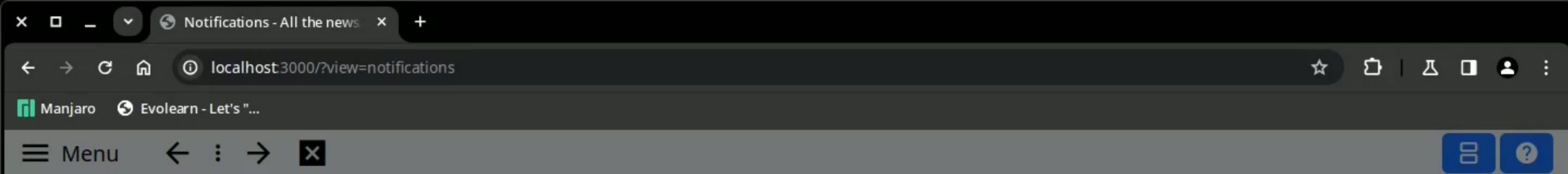
<> The Knapsack Problem & Genetic Algorithms - Co... Copy link

Delete Notification

Important Announcement 2/5/2024 1:21:35 PM

Remove All Notifications

Get All Notifications



Change in the study material 2/5/2024 1:25:49 PM

I have added two new documents that I would like you to take a look at.

Delete Notification

Change in the study material

I have added two new documents that I would like you to take a look at.

 Copy link

Delete Notification

Important Announcement 2/5/2024 1:21:35 PM

Remove All Notifications

Get All Notifications

Notifications - All the news

localhost:3000/?view=notifications

Manjaro Evolearn - Let's ...

Menu

Change in the study material 2/5/2024 1:25:49 PM

I have added two new documents that I would like you to take a look at.

Delete Notification

Informational Video 2/5/2024 1:24:14 PM

I would really like all of you to take look at the following video



<> The Knapsack Problem & Genetic Algorithms - Co... Copy link

Delete Notification

Important Announcement 2/5/2024 1:21:35 PM

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Manjaro Evolearn - Let's ...

Menu

Informational Video 2/5/2024 1:24:14 PM

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 <> The Knapsack Problem & Genetic Algorithms - Co... Copy link

Delete Notification

Important Announcement 2/5/2024 1:21:35 PM

I would like you to take a look at quiz No 3

Delete Notification

Notification Title 2/5/2024 1:17:58 PM

This is the notification body

Remove All Notifications

Get All Notifications

Notifications - All the news

localhost:3000/?view=notifications

Manjaro Evolearn - Let's ...

Menu

Informational Video 2/5/2024 1:24:14 PM

I would really like all of you to take look at the following video

<> The Knapsack Problem & Genetic Algorithms - Co... Copy link

Delete Notification

Important Announcement 2/5/2024 1:21:35 PM

I would like you to take a look at quiz No 3

Delete Notification

Notification Title 2/5/2024 1:17:58 PM

This is the notification body

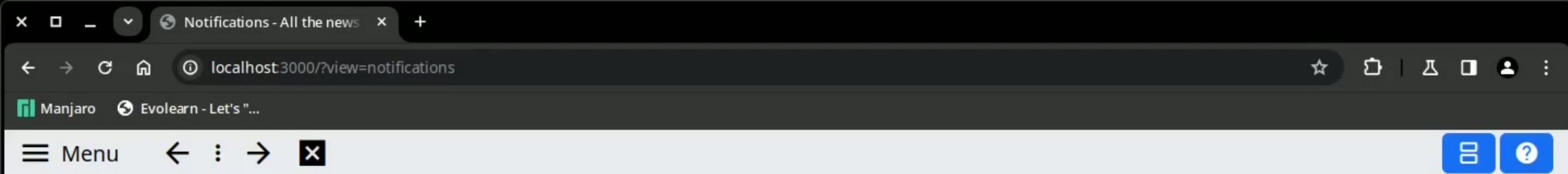
Remove All Notifications

Get All Notifications

The image shows a web browser window with a notifications interface. The top bar includes standard browser controls (back, forward, search, etc.) and a title bar for 'Notifications - All the news'. Below the title bar, the URL 'localhost:3000/?view=notifications' is visible. The main content area displays three notifications as cards:

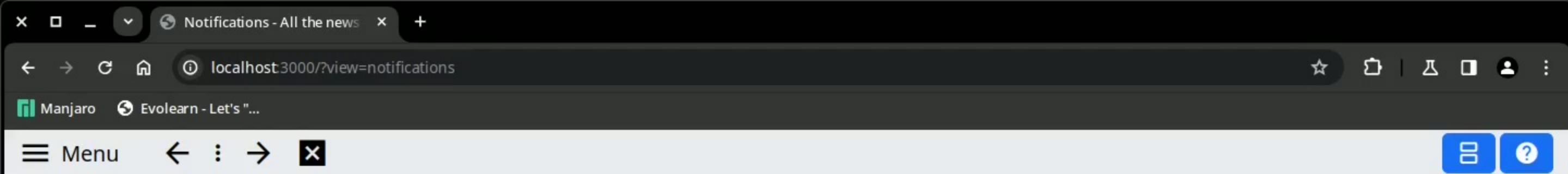
- Informational Video** (2/5/2024, 1:24:14 PM): A message encouraging users to watch a video about the Knapsack Problem & Genetic Algorithms. It includes a thumbnail image of a person and binary code, and a 'Copy link' option.
- Important Announcement** (2/5/2024, 1:21:35 PM): A message prompting users to take a look at quiz No 3.
- Notification Title** (2/5/2024, 1:17:58 PM): A message stating 'This is the notification body'.

Each notification card features a 'Delete Notification' button with a trash icon. At the bottom of the page are two large blue buttons: 'Remove All Notifications' on the left and 'Get All Notifications' on the right.



Remove All Notifications

Get All Notifications



Remove All Notifications

Get All Notifications

Notifications - All the news

localhost:3000/?view=notifications

Manjaro Evolearn - Let's ...

Menu

Change in the study material 2/5/2024 1:25:49 PM

I have added two new documents that I would like you to take a look at.

Delete Notification

Informational Video 2/5/2024 1:24:14 PM

I would really like all of you to take look at the following video

 <> The Knapsack Problem & Genetic Algorithms - Co... Copy link

Delete Notification

Important Announcement 2/5/2024 1:21:35 PM

Remove All Notifications

Get All Notifications

Teacher Notifications

localhost:3000/teacher

Manjaro - Evolearn - Let's ...

### Teacher Credentials

User Name: [ ]

Password:  it174973  
it174974

Notification Title: [ ]

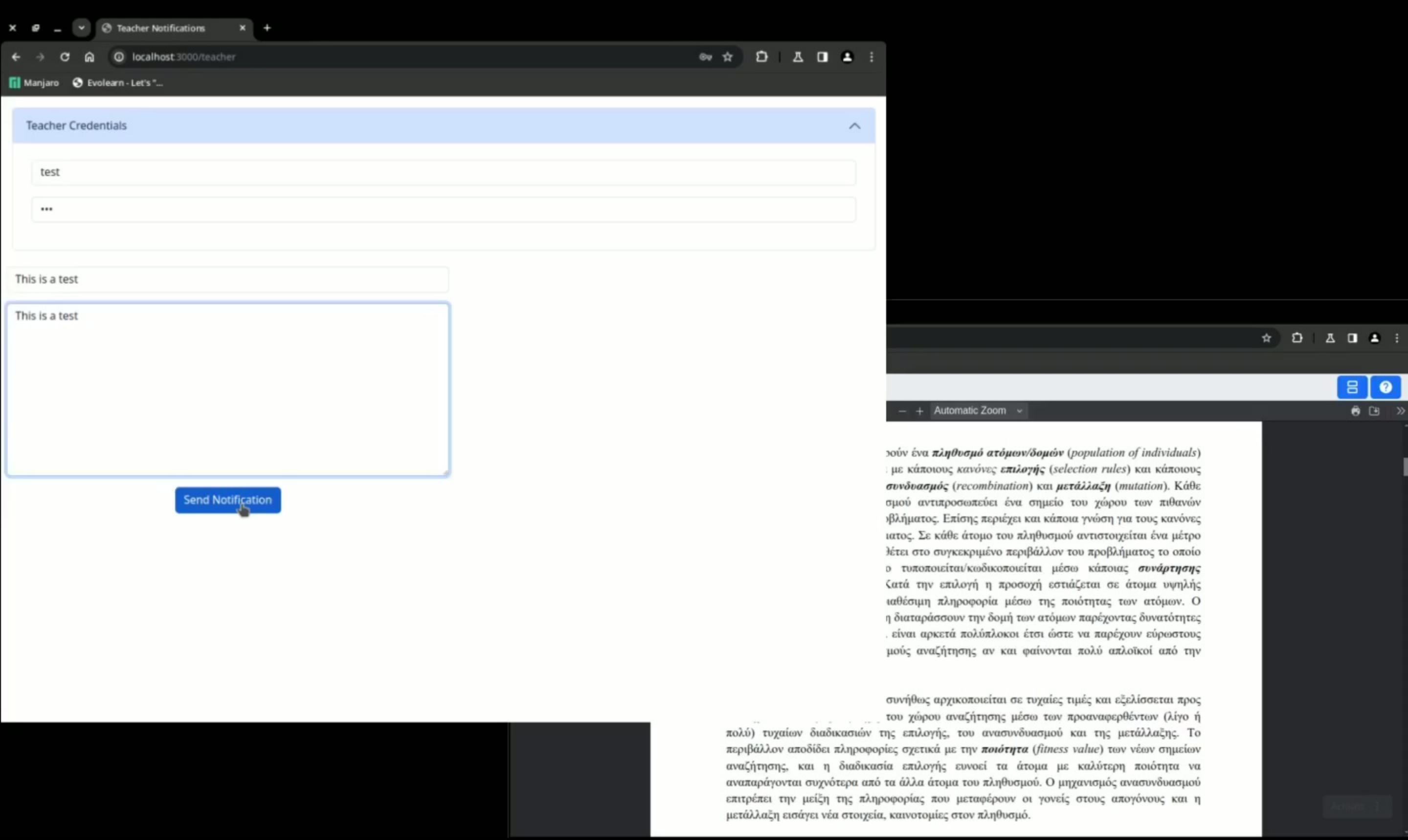
Notification Body: [ ]

**Send Notification**

ούν ένα πληθυσμό ατόμων/δομέν (*population of individuals*) με κάποιους κανόνες επιλογής (*selection rules*) και κάποιους συνδυασμός (*recombination*) και μετάλλαξη (*mutation*). Κάθε σμιού αντιπροσωπεύει ένα σημείο του χώρου των πιθανών ψηλήματος. Επίσης περιέχει και κάποια γνώση για τους κανόνες ιατος. Σε κάθε άτομο του πληθυσμού αντιστοιχείται ένα μέτρο ήτει στο συγκεκριμένο περιβάλλον του προβλήματος το οποίο ο τυποποιείται/κωδικοποιείται μέσω κάποιας συνάρτησης. Σατά την επιλογή η προσοχή εστιάζεται σε άτομα υψηλής ιαθέσιμη πληροφορία μέσω της ποιότητας των ατόμων. Ο διαταράσσουν την δομή των ατόμων παρέχοντας δυνατότητες είναι αρκετά πολύπλοκοι έτσι ώστε να παρέχουν εύρωστους μόνις αναζήτησης αν και φαίνονται πολύ απλοϊκοί από την συνήθως αρχικοποιείται σε τυχαίες τιμές και εξελίσσεται προς του χώρου αναζήτησης μέσω των προαναφερθέντων (λίγο ή πολύ) τυχαίων διαδικασιών της επιλογής, του ανασυνδυασμού και της μετάλλαξης. Το περιβάλλον αποδίδει πληροφορίες σχετικά με την ποιότητα (*fitness value*) των νέων σημείων αναζήτησης, και η διαδικασία επιλογής ευνοεί τα άτομα με καλύτερη ποιότητα να αναπαράγονται συχνότερα από τα άλλα άτομα του πληθυσμού. Ο μηχανισμός ανασυνδυασμού επιτρέπει την μείζη της πληροφορίας που μεταφέρουν οι γονείς στους απογόνους και η μετάλλαξη εισάγει νέα στοιχεία, καινοτομίες στον πληθυσμό.

Automatic Zoom

Αναζήτηση



This is a test

**Send Notification**

Evolutionary Algorithm

localhost:3000/?view=pdf&item=3&page=4

Manjaro Evolearn - Let's ...

Menu

Automatic Zoom

4 of 41

Πιο συγκεκριμένα, οι EA διατηρούν ένα πλήθυσμό ατόμων/δομών (*population of individuals*) τον οποίο εξελίσσουν σύμφωνα με κάποιους κανόνες επιλογής (*selection rules*) και κάποιους τελεστές (*operators*), όπως ανασυνδυασμός (*recombination*) και μετάλλαξη (*mutation*). Κάθε άτομο (*individual*) του πληθυσμού αντιπροσωπεύει ένα σημείο του χώρου των πιθανών λύσεων ενός συγκεκριμένου προβλήματος. Επίσης περιέχει και κάποια γνώση για τους κανόνες του περιβάλλοντος του προβλήματος. Σε κάθε άτομο του πληθυσμού αντιστοιχείται ένα μέτρο της ποιότητας (*fitness*) που διαθέτει στο συγκεκριμένο περιβάλλον του προβλήματος το οποίο αντιμετωπίζεται.

ποιότητας (*fitness*)

ποιότητας αξιολόγησης

ανασυνδυασμός

διερεύνησης των αποτελεσμάτων

Ο αρχικός πληθυσμός ενός EA συνήθως αρχικοποιείται σε τυχαίες τιμές και εξελίσσεται προς διαδοχικά καλύτερες περιοχές του χώρου αναζήτησης μέσω των προαναφερθέντων (λίγο ή πολύ) τυχαίων διαδικασιών της επιλογής, του ανασυνδυασμού και της μετάλλαξης. Το περιβάλλον αποδίδει πληροφορίες σχετικά με την ποιότητα (*fitness value*) των νέων σημείων αναζήτησης, και η διαδικασία επιλογής ευνοεί τα άτομα με καλύτερη ποιότητα να αναπαράγονται συγχότερα από τα άλλα άτομα του πληθυσμού. Ο μηχανισμός ανασυνδυασμού επιτρέπει την μείζη της πληροφορίας που μεταφέρουν οι γονείς στους απογόνους και η μετάλλαξη εισάγει νέα στοιχεία, καινοτομίες στον πληθυσμό.

**Teacher Notifications**

localhost:3000/teacher

Manjaro Evolearn - Let's "..."

Teacher Credentials

test

\*\*\*

This is a test

This is a test

**Send Notification**

**Settings - Let's change som...**

localhost:3000/?view=settings

Manjaro Evolearn - Let's "..."

Menu

Editor AutoSave

You can enable/disable global autosave for the note editor.  
This setting can be overwritten temporarily by clicking on the autosave button in the editor.

Teacher Notes

You can show/hide the notes included in the study material and the exercises.  
Make sure to check them frequently for any changes.

Do Not Disturb Mode

You can decide whether or not to display the teacher notifications the moment they are sent.  
If you enable this mode of operation, the menu notifications item will show you how many you have missed.

Offline Support Mode

You can enable/disable the application's ability to function offline.

**Restart Application**

The image shows a desktop environment with two windows open. The top window is titled "Teacher Notifications" and has the URL "localhost:3000/teacher". It contains a form with fields for "test" and "\*\*\*", and a text area with the placeholder "This is a test". Below the text area is a "Send Notification" button. The bottom window is titled "Evolutionary Algorithm" and has the URL "localhost:3000/?view=pdf&item=3". It displays a sidebar with "Study Material" selected, followed by "Exercises", "Quizzes", "Settings", "Notifications" (which has a red notification badge "+1"), and "About". The main content area contains Greek text about evolutionary algorithms, mentioning population, selection rules, recombination, and mutation. The footer of the bottom window says "Copyleft 2024 ©".

Teacher Notifications

localhost:3000/teacher

Manjaro Evolearn - Let's "..."

Teacher Credentials

test

\*\*\*

This is a test

This is a test

Send Notification

Evolutionary Algorithm

localhost:3000/?view=pdf&item=3

Manjaro Evolearn - Let's "..."

EvoLearn - Let's "Evolve"  
Our learning!

Study Material

Exercises

Quizzes

Settings

Notifications +1

About

Automatic Zoom

CopyLeft 2024 ©

**Teacher Notifications**

localhost:3000/teacher

Manjaro Evolearn - Let's "..."

Teacher Credentials

test

\*\*\*

This is a test

This is a test

**Send Notification**

**Notifications - All the news**

localhost:3000/?view=notifications

Manjaro Evolearn - Let's "..."

Menu

This is a test 2/5/2024 1:54:47 PM

This is a test

**Delete Notification**

This is a test 2/5/2024 1:54:27 PM

This is a test

**Delete Notification**

Change in the study material 2/5/2024 1:25:49 PM

I have added two new documents that I would like you to take a look at.

**Remove All Notifications**

**Get All Notifications**

**Σας ευχαριστώ  
για τον χρόνο  
που διαθέσατε**

Ερωτήσεις  
?