OINĂ

Cudla Ioan-Radu

TELL ME AND I WILL FORGET

Physics of cultural identity

SHOW ME AND I MAY REMEMBER

Why do I need that?

INVOLVE ME AND I WILL UNDERSTAND

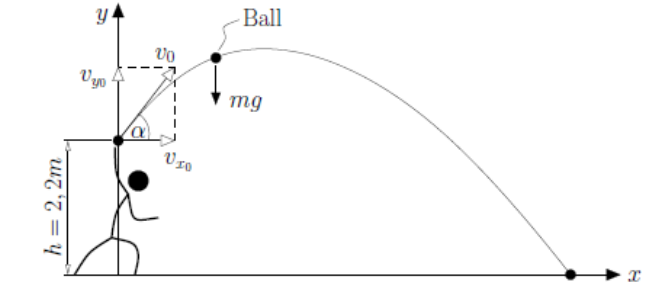
The evolution of future

TELL ME

OINĂ

Romanian traditional sport, similar in many ways to baseball.

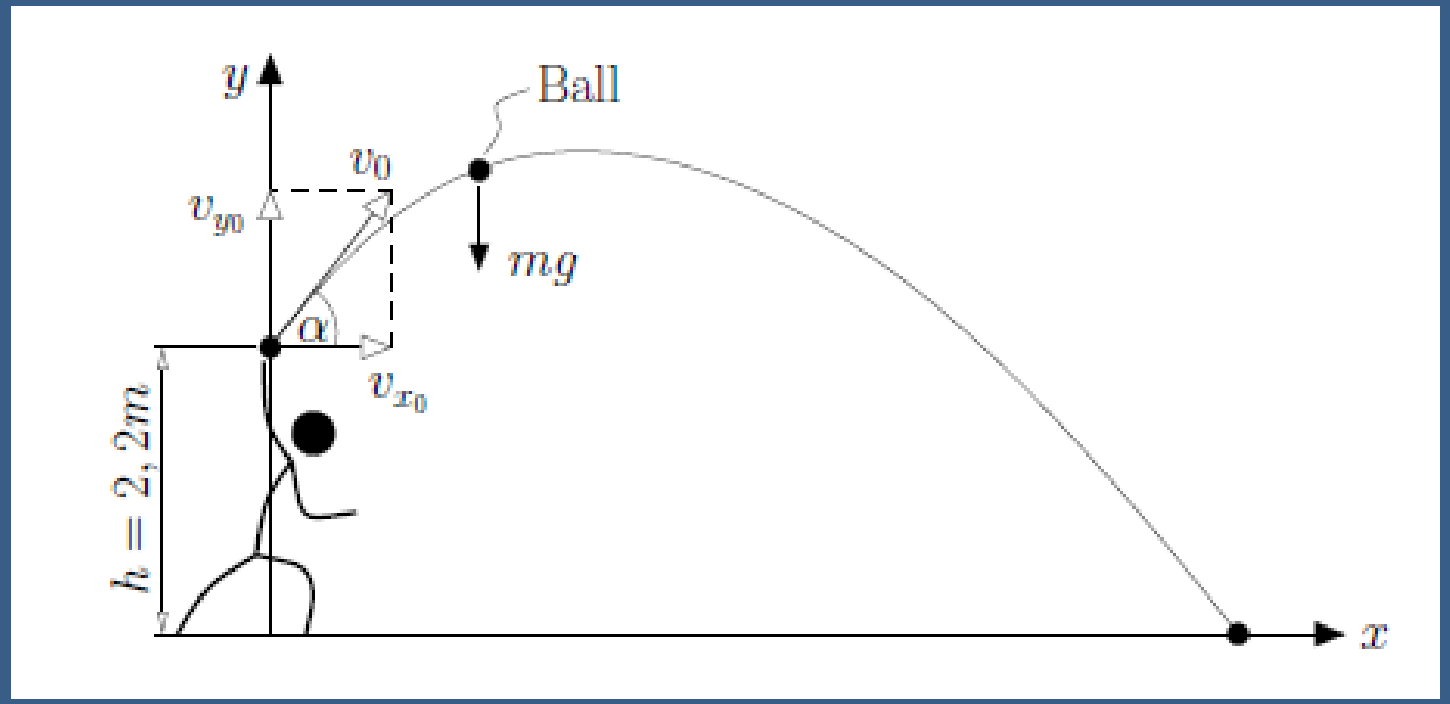
TARGET



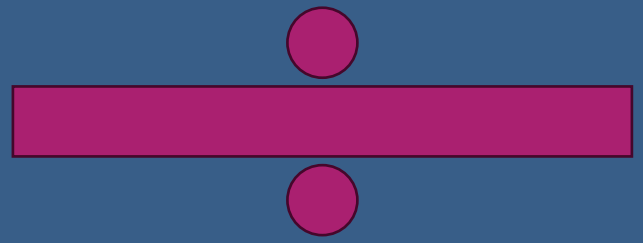
- As part of a sports event, an athlete has to throw a ball as far as possible. The ball is thrown from a height of h = 2.2 m with an angle α. Let the magnitude of the ejection velocity v0 be given as the mean value of the following velocities:

- v1 = 13.4 m/s
- v2 = 13.7 m/s
- v3 = 13.5 m/s
- v4 = 13.8 m/s .

- The earth's gravity is g = 9.81 m/ss.


y
Ball
v_0
v_{y0}
mg
α
v_{x_0}
$h = 2,2m$
x

- Find the mean value of the velocity.

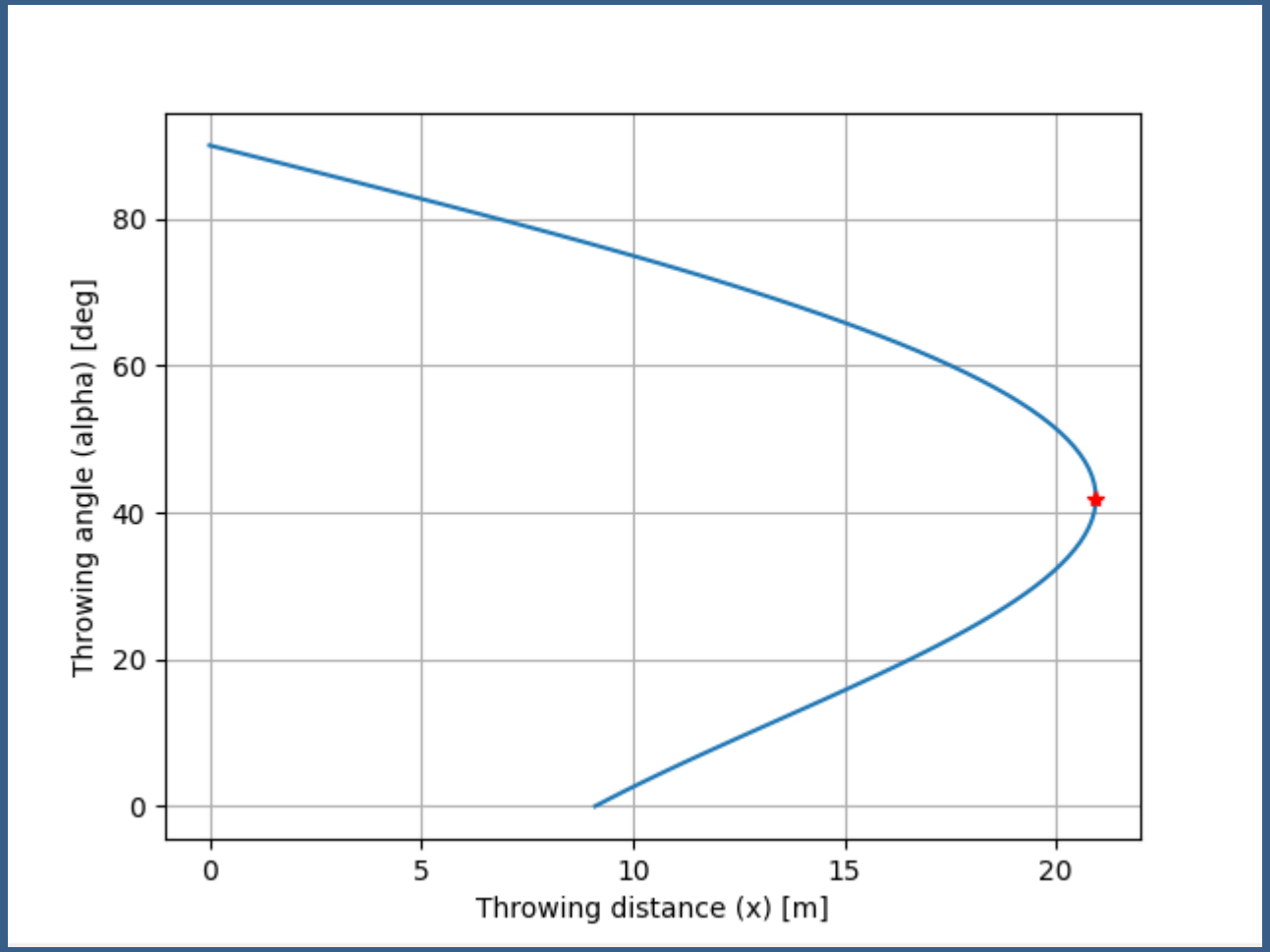


- The throwing distance is calculated as follows:

$$x = \frac{v_{x0}}{g}\left(v_{y0} + \sqrt{v_{y0}^2 + 2gh}\right)$$

- Calculate the throwing distance of the ball for the angle $\alpha \in [0^\circ, 90^\circ]$ with a step of 1°.

- Determine the maximum angle α_{max} for which the maximum throw distance x_{max} is reached. Then mark this point in your plot.


Throwing angle (alpha) [deg]
0
20
40
60
80
0
5
10
15
20
Throwing distance (x) [m]

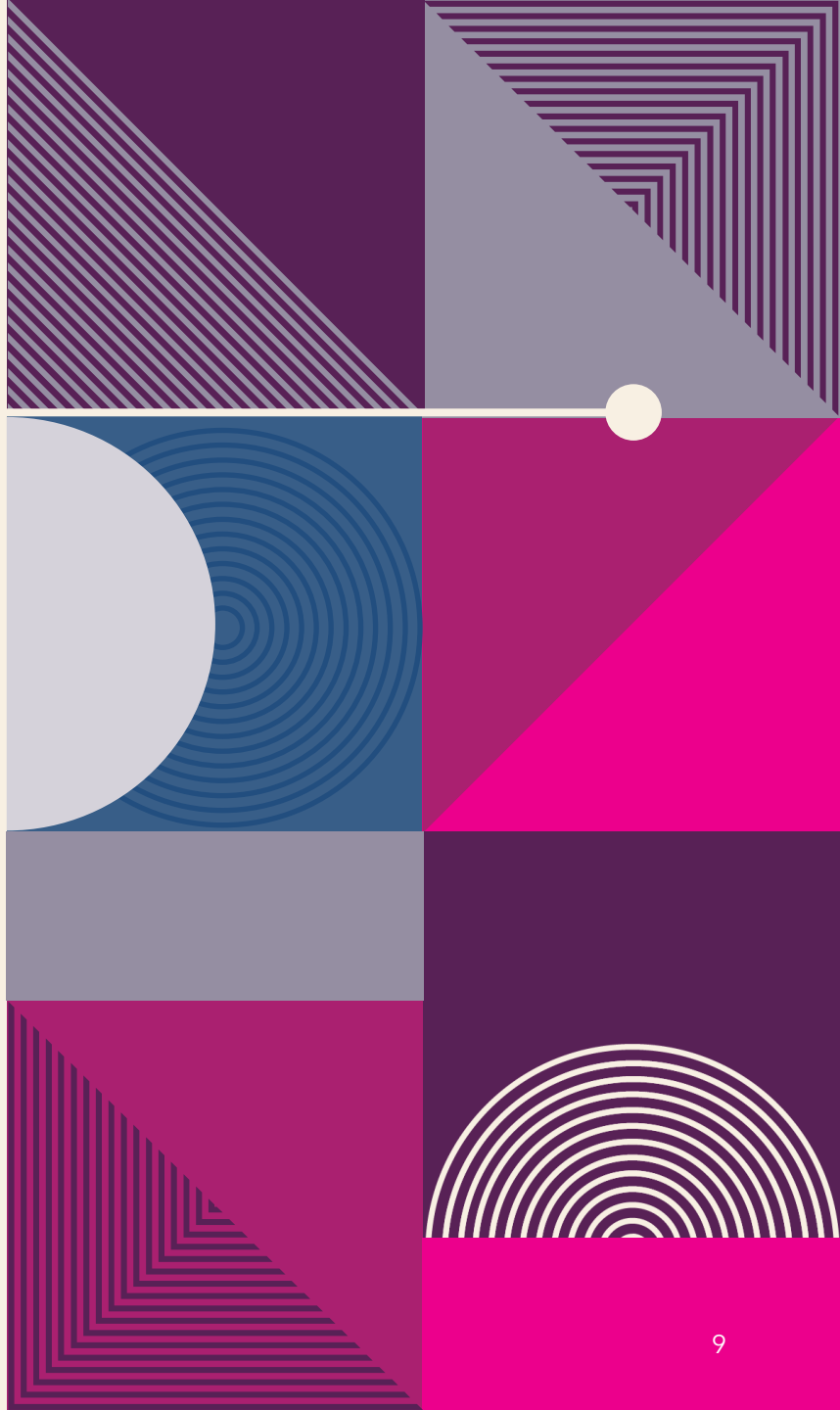
SHOW ME

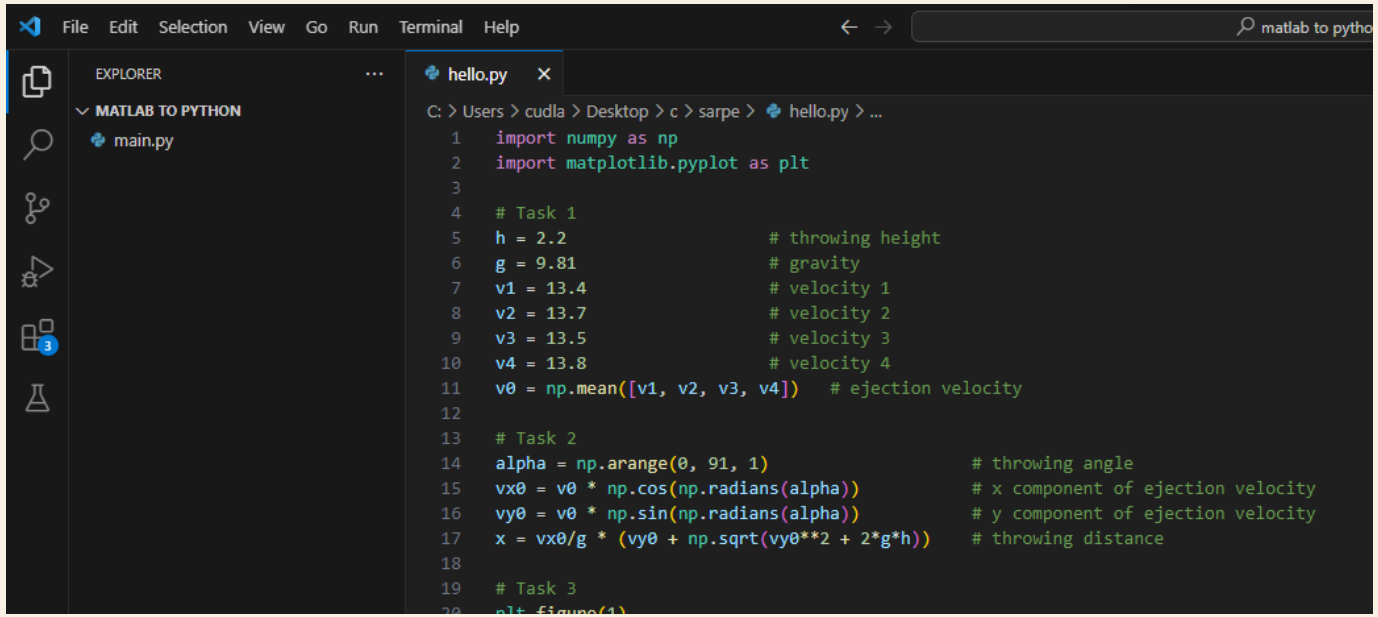
PYTHON

Why?

NUMPY

Why not MATLAB?

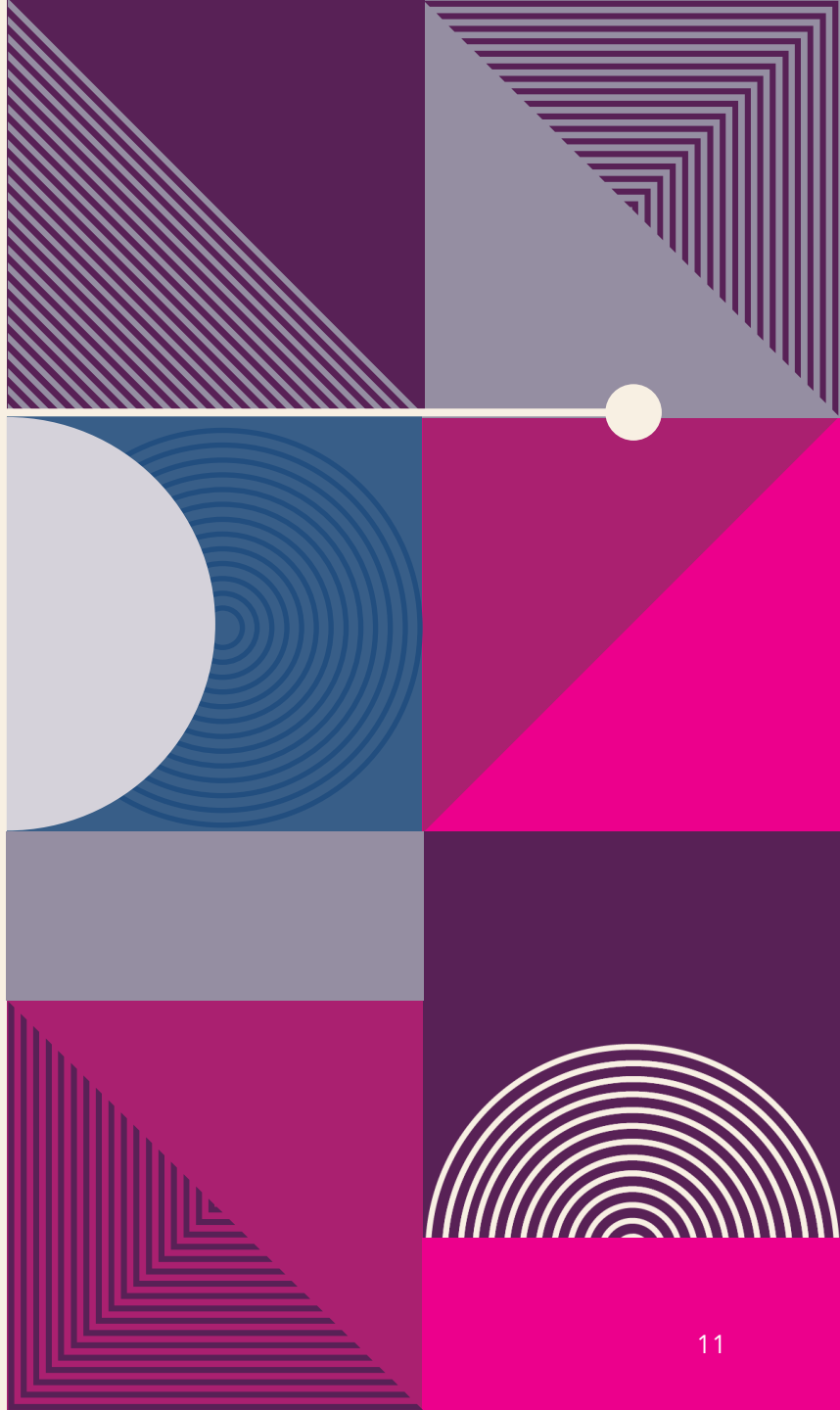



File Edit Selection View Go Run Terminal Help
matlab to pytho
EXPLORER
MATLAB TO PYTHON
main.py
hello.py
C: > Users > cudla > Desktop > c > sarpe > hello.py > ...
import numpy as np
import matplotlib.pyplot as plt
# Task 1
h = 2.2 # throwing height
g = 9.81 # gravity
v1 = 13.4 # velocity 1
v2 = 13.7 # velocity 2
v3 = 13.5 # velocity 3
v4 = 13.8 # velocity 4
v0 = np.mean([v1, v2, v3, v4]) # ejection velocity
# Task 2
alpha = np.arange(0, 91, 1) # throwing angle
vx0 = v0 * np.cos(np.radians(alpha)) # x component of ejection velocity
vy0 = v0 * np.sin(np.radians(alpha)) # y component of ejection velocity
x = vx0/g * (vy0 + np.sqrt(vy0**2 + 2*g*h)) # throwing distance
# Task 3

TASK 1

```python
import numpy as np
import matplotlib.pyplot as plt

# Task 1
h = 2.2                          # throwing height
g = 9.81                         # gravity
v1 = 13.4                        # velocity 1
v2 = 13.7                        # velocity 2
v3 = 13.5                        # velocity 3
v4 = 13.8                        # velocity 4
v0 = np.mean([v1, v2, v3, v4])   # ejection velocity
```



TASK 2&3

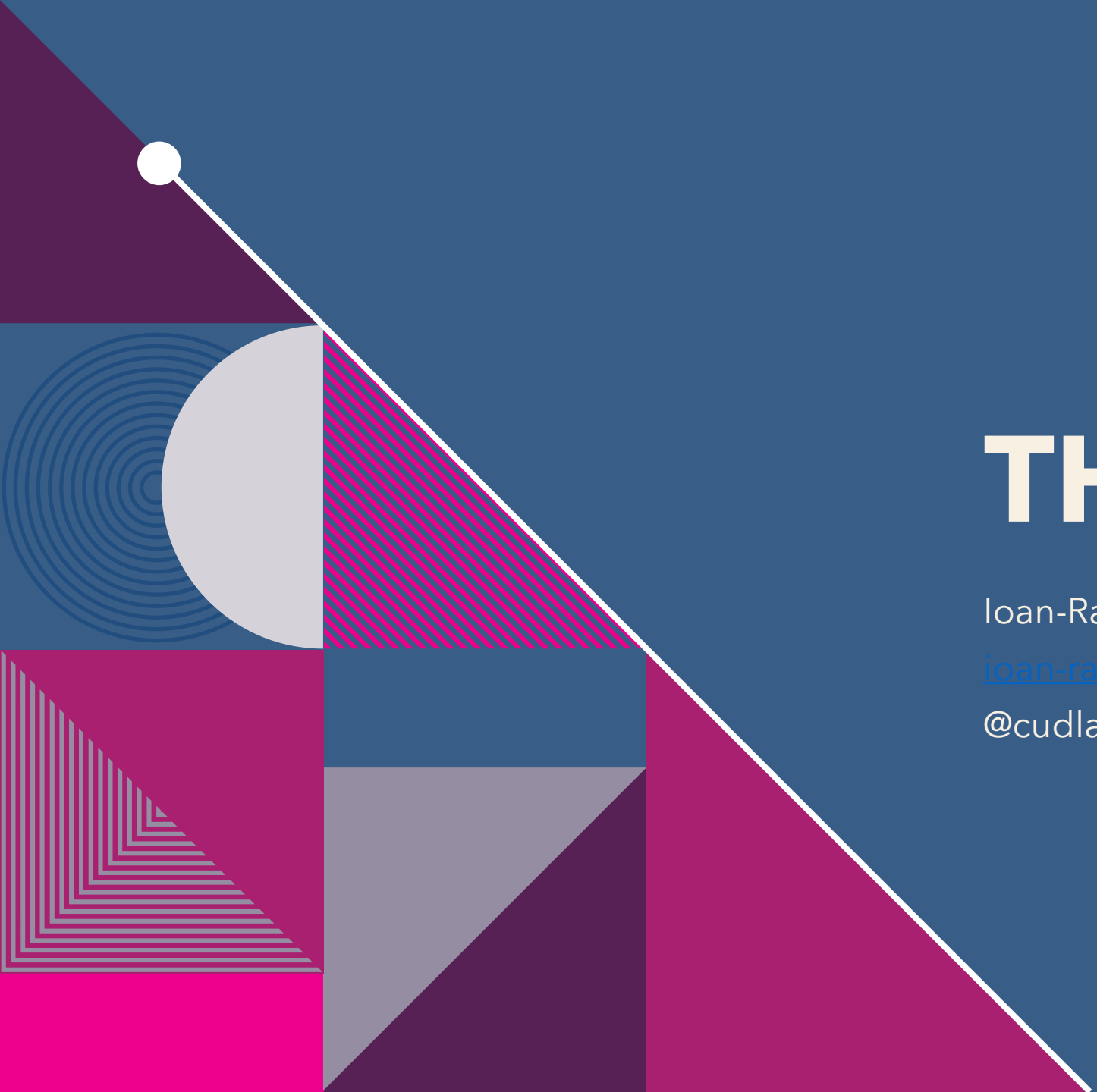
```
# Task 2
alpha = np.arange(0, 91, 1)                    # throwing angle
vx0 = v0 * np.cos(np.radians(alpha))           # x component of ejection velocity
vy0 = v0 * np.sin(np.radians(alpha))           # y component of ejection velocity
x = vx0/g * (vy0 + np.sqrt(vy0**2 + 2*g*h))    # throwing distance
```

```
# Task 3
plt.figure(1)
plt.plot(x, alpha)
plt.xlabel('Throwing distance (x) [m]')
plt.ylabel('Throwing angle (alpha) [deg]')     #plotting the results
plt.grid(True)
```

TASK 4

```
# # Task 4
max_ind = np.argmax(x)
x_max = x[max_ind]
alpha_max = alpha[max_ind]
plt.plot(x_max, alpha_max, 'r*')
plt.show()
```

INVOLVE ME



THANK YOU

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