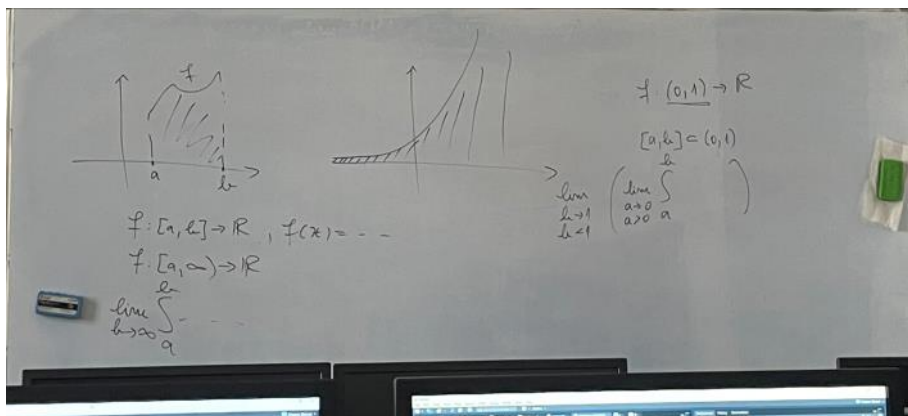
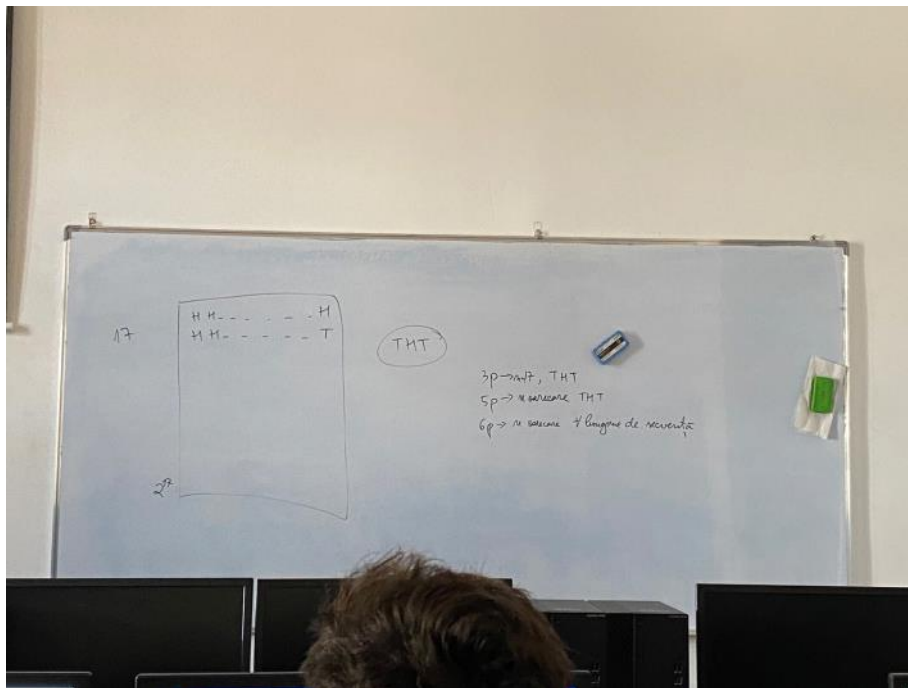


# Laborator 5

Tuesday, March 22, 2022 13:02



## INTEGRALE EULERIENE

### 1) Integrala gamma

$$\Gamma(a) = \int_0^{\infty} x^{a-1} \cdot e^{-x} dx, \quad a > 0$$

Proprietati

- 1)  $\Gamma(1) = 1$
- 2)  $\Gamma(a) = (a-1) \cdot \Gamma(a-1) \quad \forall a > 1$
- 3)  $\Gamma(n) = (n-1)! \quad \forall n \in \mathbb{N}^*$
- 4)  $\Gamma\left(\frac{1}{2}\right) = \sqrt{\pi}$

### 3) Integrala Euler-Poisson

$$\int_0^{\infty} e^{-x^2} dx = \frac{\sqrt{\pi}}{2}$$

### 2) Integrala beta

$$\beta(a, b) = \int_0^1 x^{a-1} \cdot (1-x)^{b-1} dx, \quad a > 0, b > 0$$

Proprietati

- 1)  $\beta(a, b) = \beta(b, a) \quad \forall a, b > 0$
- 2)  $\beta(a, b) = \frac{\Gamma(a) \cdot \Gamma(b)}{\Gamma(a+b)} \quad \forall a, b > 0$
- 3)  $\beta(a, b) = \int_0^{\infty} \frac{x^{a-1}}{(1+x)^{a+b}} dx, \quad \forall a, b > 0$
- 4) Dacă  $a+b=1$  atunci:  $\beta(a, b) = \frac{\pi}{\sin(a\pi)}$

#### Teme + Bonus:

Implementati

# Aruncam o moneda de 17 ori

# Cautam secventa THT

# Sa fie scalabila

# 3p pt n 17, 5p n oarecare

# De ce functioneaza asa? ^ 3p. nu stim sigur ce face

#TEMA:

#1) Creati o functie in R numita gama\_numa care sa implementeze proprietatile

#pe care le are functia gama(vezi documentul Integrale euleriene) si sa

#foloseasca apelul functiei integrate doar atunci cand parametrul nu satisface

#nicio conditie "buna"

```
# gama_numa <- function(...)
```

```
# {
```

```
#daca n e natural atunci foloseste propr. 3) #folosim functia din R numita factorial
```

```
#daca n e de forma b/2(cu b natural) foloseste formula 2) si 4)
```

```
#altfel foloseste formula 2) pana cand argumentul devine subunitar
```

```
#si doar pentru acea valoare calculeaza cu integrate
```

#2) Implementati o functie care calculeaza beta(a,b) folosindu-va de proprietati

#si de integrala gama

Toate #Q din lab sunt teme