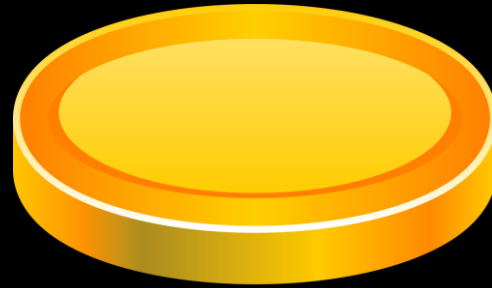


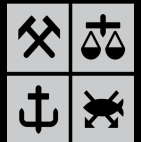
# **RANDOM NUMBER GENERATION**

# WHAT IS RANDOM?

- No true randomness
- Randomness comes from lack of information
- People are notoriously bad at generating random sequences



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# PSEUDO RANDOM NUMBERS

- Algorithm generating random numbers
- Deterministic
- Mimicking randomness
- Reproducibility
- Set seed!
- Uniform distribution on  $[0,1]$

$$U \sim \text{Uniform}(0,1)$$

$X$  has cumulative distribution function  $F(x)$

$$X = F^{-1}(U)$$

$$P(X \leq x) = P(F^{-1}(U) \leq x)$$

$$\begin{aligned} & \stackrel{F_U(u) = u}{=} P(U \leq F(x)) = F(x) \end{aligned}$$

$$u_1, u_2, u_3, \dots, u_n$$



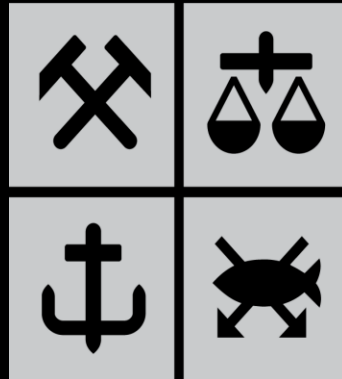
$$F^{-1}(u_1), F^{-1}(u_2), F^{-1}(u_3), \dots, F^{-1}(u_n)$$



$$x_1, x_2, x_3, \dots, x_n$$

**INVERSE TRANSFORM SAMPLING**

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Sondre Hølleland  
Geir Drage Berentsen