LESSON 3. PROBABILITY DISTRIBUTIONS

3.1. Probability

- Probability experiment, outcome and sample space
- Classical and empirical probability
- Law of large numbers

3.2. Random variables

3.3. Probability distributions and cumulative probability distributions

3.4. Types of probability distributions

- Discrete
- Continuous

3.5. Some distributions used in inferential statistics

Lesson 3: Assignments

1. Find the sample space for the gender of the children if a family has three children. Use B for boy and G for girl.

Når vi snakker om sample space, så snakker vi om en lille fraktion af en befolkning.

I tilfældet, kan det ses at B står for Dreng og G for Pige.

2. If a family has three children, find the probability that all the children are girls.

3. If the probability that a person lives in an industrialized country of the world is 1/5 , find the probability that a person does not live in an industrialized country.

4. The table below contains information on the number of daily emergency service calls received by the volunteer ambulance service of Happytown for the last 50 days: 22 days of which 2 emergency calls were received, 9 days of which 3 emergency calls were received, 8 days of which no emergency calls were received, etc.

Number of Service Calls per Day (X)	Number of Days (fj)
0	8
1	10
2	22
3	9
4	1
Total	50

What is the probability that 2 or more emergency calls are received on a day?

5. Determine which of the following distributions is a cumulative probability distribution.

i)

X	1	2	3	4	5
P(X≤x)	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{9}{20}$	$\frac{6}{8}$	$\frac{20}{20}$

ii)

X	22	33	44	55	66	77
P(X≤x)	-0.4	0.2	0.4	0.7	0.8	1

iii)

X	0	3	5	6
P(X≤x)	0.25	0.25	0.25	0.25

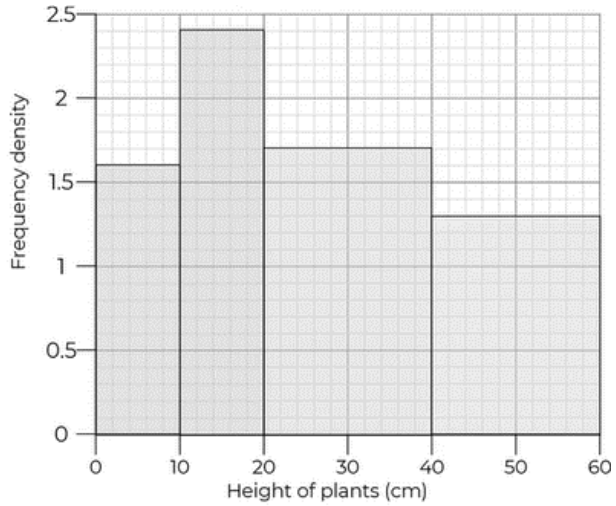
iv)

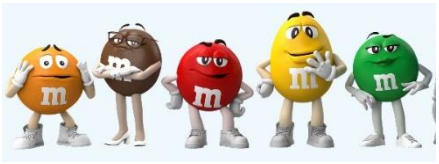
X	0	2	4	6
P(X≤x)	$\frac{1}{3}$	$\frac{1}{4}$	$\frac{1}{6}$	$\frac{4}{16}$

6. The grades of a group of 1000 students in an exam are normally distributed with a mean of 70 and a standard deviation of 10. Approximately, how many students have grades greater than 80?
   a) 680 students

b) 840 students
c) 160 students
d) 50 students
e) 320 students

7. We visited a field with plants. We measured the height of each plant and built the histogram below. We then chose one plant at random. What is the probability that the plant is under 30 cm tall?





8. M&M sweets are of varying colors and the different colors occur in different proportions. The table below gives the probability that a randomly chosen M&M has each colour, but the value for orange candies is missing.

Color	Brown	Red	Yellow	Green	Orange
Probability	0.2	0.3	0.2	0.1	?

You draw an M&M at random from a packet. What is the probability that you get either a green one or an orange one?

9. What percent of cases are likely to be between 85 and 93 in a normal distribution with mean 87 and variance 4?
   a. 83.85%
   b. 30.72%
   c. 49.87%
   d. 69.02%
   e. none of these

10. A survey found that one out of five Americans say he or she has visited a doctor in any given month. If 10 people are selected at random, find the probability that exactly 3 will have visited a doctor last month.

11. Suppose a loaded die has the following model:

Face	1	2	3	4	5	6
Probability	0.3	0.1	0.1	0.1	0.1	0.3

If this die is thrown and the top face shows an odd number,

a. What is the probability that the die shows a four?
b. What is the probability that the die shows a 1?