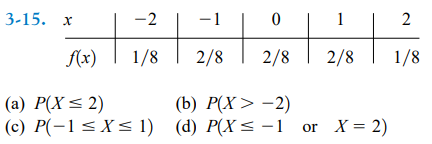
**Chapter 3: Discrete random variables and Probability distribution**

1. **Discrete random variables  
   Discrete** variables produce outcomes that come from a **counting process.**

(e.g., number of classes you are taking). \*the number of

1. **Probability distribution table → ?population mean=expected value, population variance, population standard deviation, probability**

**--> population**

P(X<=2) = 1

P(X>-2) = P(X=-1) + P(X=0) + P(X=1) + P(X=2)

= 2/8 + 2/8 + 2/8 + 1/8 = 7/8

P(X<3) = 1

P(X=0) = 2/8

P(X=3) = 0

P(X=0.75) = 0

1. **Probability mass functions**

**Graphical user interface, text, application

Description automatically generated**

**Text, letter

Description automatically generated**

**f(x) = P(X=x)**

1. **Cumulative distribution function**

**Graphical user interface, text

Description automatically generated**

**Text, letter

Description automatically generated**

1. **Mean and Variance of a Discrete Random Variable 🡪 CASIO**

**Text

Description automatically generated**

1. **Mean**

**580VN: Menu - 6 - 1 - Data - AC - OPTN - 2**

**570VN: Mode - 3 - 1 - Data - AC - Shift - 1 - 4 - 2**

1. **Variance**

**580VN: Menu - 6 - 1 - Data - AC - OPTN - 2**

**570VN: Mode - 3 - 1 - Data - AC - Shift - 1 - 4 - 3 - ^2**

Text, table

Description automatically generated

  
 Text

Description automatically generated with medium confidence

1. **Discrete Probability Distributions**

**probability**

**mean/variance/standard deviation**

**range**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Distribution** | **Notation** | **Range** | **pmf** | **Mean/Expected Value** | **Variance** |
| **i. Discrete Uniform** |  |  |  |  |  |
| **ii. Binomial** |  |  |  |  |  |
| **iii. Geometric** |  |  |  |  |  |
| **iv. Negative binomial** |  |  |  |  |  |
| **v. Hypergeometric** |  |  |  |  |  |
| **vi. Poisson** |  |  |  |  |  |

1. **Discrete uniform distribution**

X: a discrete uniform random variable over the integer set (a, a+1, …, b)

Text

Description automatically generated

X ~ Discrete Uniform (0, 99)

Text

Description automatically generated

P(X<6) = 0.5

1. **Binomial distribution**

X: the number of successes in n trials

Text

Description automatically generated with low confidence

Graphical user interface, text, application

Description automatically generated

Text

Description automatically generated

b

Graphical user interface, text

Description automatically generated with medium confidence

B. 1 – (f(0) + … + f(8) )

Graphical user interface, text

Description automatically generated

A 0.398

Graphical user interface, text, application

Description automatically generated

C 0.0024

Text

Description automatically generated

c. 0,3362

1. **Geometric distribution**

X: the number of trials until the first success

Graphical user interface, text, application

Description automatically generated

b. 0,019

1. **Negative binomial distribution**

X: the number of trials until r successes occur

Graphical user interface, text, application

Description automatically generated

A . 0.132

1. **Hypergeometric distribution**

X: the number of successes in the sample

Graphical user interface, text

Description automatically generated

N = 36

n=7

k = 12

x = 3

b. 0.28

1. **Poisson distribution**

X: the number of events in a given unit of time/distance/area/volume

Graphical user interface, text

Description automatically generated

d

Graphical user interface, text, application

Description automatically generated

A

Text

Description automatically generated with medium confidence

30min = half an hour but the expected call per hour = mean = 15.

15/2 = 7.5

Text

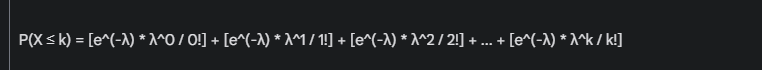
Description automatically generated with medium confidence

D

Text

Description automatically generated with medium confidence

D



K = 4

Lambda = 1.21

Text

Description automatically generated

Mean = 2^2 = 4

X = 0 because the server is idle

F(0) = 0.0183