UNIVERSITY NAME

Final Exam – 2025
variant: 1

Course Title

INDEX555

Teacher Name

Student Information (*fill completely*)

First Name .....

Last Name .....

ID .....

Full Name: ..... Student ID: .....

Attention Good luck!

- Exam Duration: 2 hours
- Permitted Materials: Permitted materials
- Any Caution

№1. *Problem* *5 point*

The joint distribution is given in the table.

		Y	
X	-1	0	1
-1	0.2	0.2	0.1
0	0	0.1	0.2
1	0	0	0.2

Are random variables correlated?

Solution:

№2. *Problem* *5 point*

Source code on Python:

```
import random, math                                    # this is comment

c = 2.2039

while True :
  u = random.random()
  y = -1.0 * math.log(random.random())
  if c * u < y * (math.exp(-1.0 * y ** 2 / 2) + y) :   # this line is extra . . . too long
    print y
    break
```

Another method for code input (see source code):

```
for (i in 1:100) {
 if (i %% 2 == 0) print(i)
}
```

We used the listings package. Now, `mean(1:100)` inline code.

Solution:

№3. *Question* *3 point*

Let X and Y be independent random variables. Find $E(XY)$. E represents the expectation of a random variable.

Answer:

Full Name: ..... Student ID: .....

№4. *Selective Test* *2 point*

What planet do you live on?

Selection:

A. Earth B. Mars C. Jupiter D. Saturn

№5. *Placement Test* *3 point*

Let $E(X) = 2$ and $E(Y) = 1$. $E(2X + Y) =$ _____ $+ E(Y)$.

№6. *Placement Test* *3 point*

Attila was king of the _____.

Total point 21

∗ ∗ ∗ *The End of Examination* ∗ ∗ ∗

UNIVERSITY NAME

Final Exam – 2025
variant: 2

Course Title

INDEX555

Teacher Name

Student Information (*fill completely*)

First Name .....

Last Name .....

ID .....

Full Name: ..... Student ID: .....

Attention Good luck!

- Exam Duration: 2 hours
- Permitted Materials: Permitted materials
- Any Caution

№1. *Problem* *5 point*

The joint distribution is given in the table.

		Y	
X	-1	0	1
-1	0.2	0.2	0.1
0	0	0.1	0.2
1	0	0	0.2

Are random variables correlated?

Solution:

№2. *Problem* *5 point*

Which probability distribution was simulated?

```
import random, math
Lambda = float( raw_input("Lambda = ") )
print -1.0 * math.log( random.random() ) / Lambda
```

Prove the actual formula that was used here.

Solution:

№3. *Question* *3 point*

Let X and Y be independent random variables. Find $E(XY)$. E represents the expectation of a random variable.

Answer:

№4. *Selective Test* *2 point*

What planet do you live on?

Selection:

A. Earth B. Mars C. Jupiter D. Saturn

Full Name: ..... Student ID: .....

№5. *Placement Test* *3 point*

Let $E(X) = 2$ and $E(Y) = 1$. $E(2X + Y) =$ _____ $+ E(Y)$.

№6. *Placement Test* *3 point*

Attila was king of the ____.

№7. *Problem* *5 point*

The joint distribution is given in the table.

		Y	
X	-1	0	1
-1	0.2	0.2	0.1
0	0	0.1	0.2
1	0	0	0.2

Are random variables correlated?

Solution:

№8. *Question* *3 point*

Let X and Y be independent random variables. Find $E(XY)$. E represents the expectation of a random variable.

Answer:

№9. *Selective Test* *2 point*

What planet do you live on?

Selection:

A. Earth B. Mars C. Jupiter D. Saturn

№10. *Placement Test* *3 point*

Let $E(X) = 2$ and $E(Y) = 1$. $E(2X + Y) =$ _____ $+ E(Y)$.

№11. *Placement Test* *3 point*

Attila was king of the ____.

Total point 37

∗ ∗ ∗ *The End of Examination* ∗ ∗ ∗