Lecture A5 - Solution

Reinforcement Learning Study

2021-01-11

차 례

Exercise 1

Using ruinf() function in R, complete the following code block that generates 1,000 random numbers that follow $exp(3)$

```
N<-1000
u<-runif(N)
x<-(-log(1-u)/3)
head(x)
```

```
## [1] 0.03397999 0.20131331 0.16484093 0.83338385 0.07893716 0.45166373
```

```
import numpy as np
N=1000
u=np.random.uniform(size=N)
x=((-np.log(1-u))/3)
print(x[0:6])
```

in python

```
## [0.40718628 0.09062599 0.1842284  0.10045622 0.0730125  0.31523505]
```
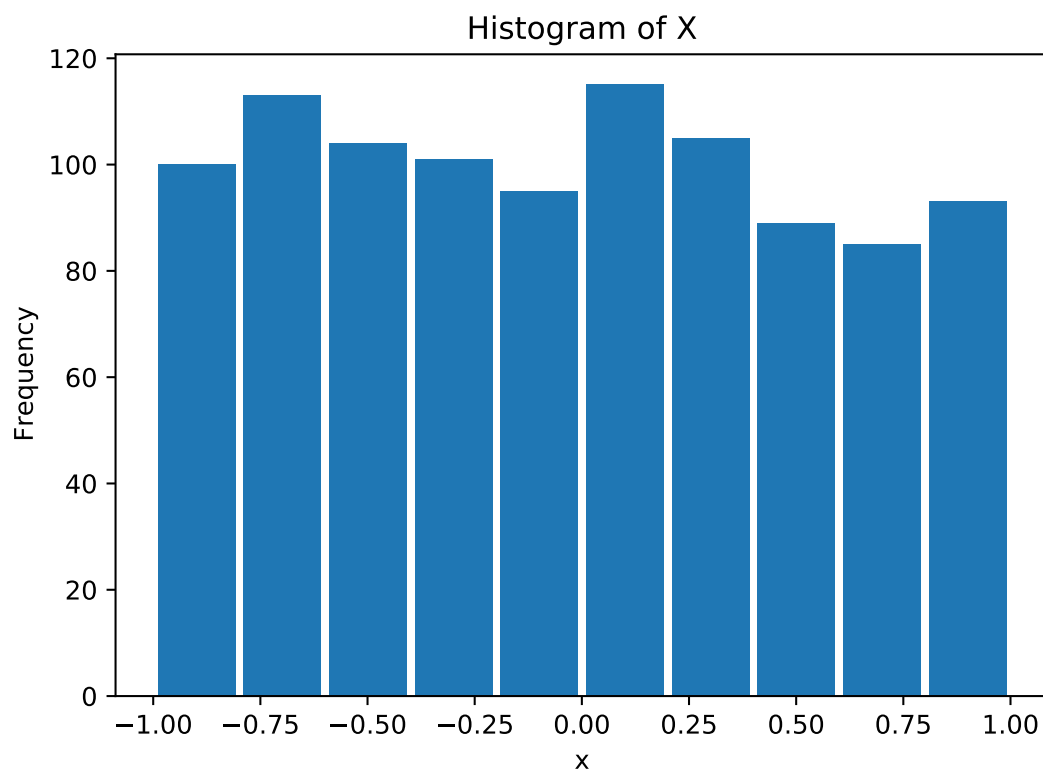
Various random numbers, Uniform random numbers p.15

```
import matplotlib.pyplot as plt
import numpy as np


x=np.random.uniform(size=1000, low=-1,high=1)


plt.hist(x, rwidth=0.9)
```

```
## (array([100., 113., 104., 101.,  95., 115., 105.,  89.,  85.,  93.]), array([-9.98921554e-
01, -7.99051246e-01, -5.99180938e-01, -3.99310630e-01,
##         -1.99440322e-01,  4.29985851e-04,  2.00300294e-01,  4.00170602e-01,
##         6.00040910e-01,  7.99911218e-01,  9.99781525e-01]), <BarContainer object of 10 artists>)
```

```
plt.xlabel("x")
plt.ylabel("Frequency")
plt.title("Histogram of X")
```

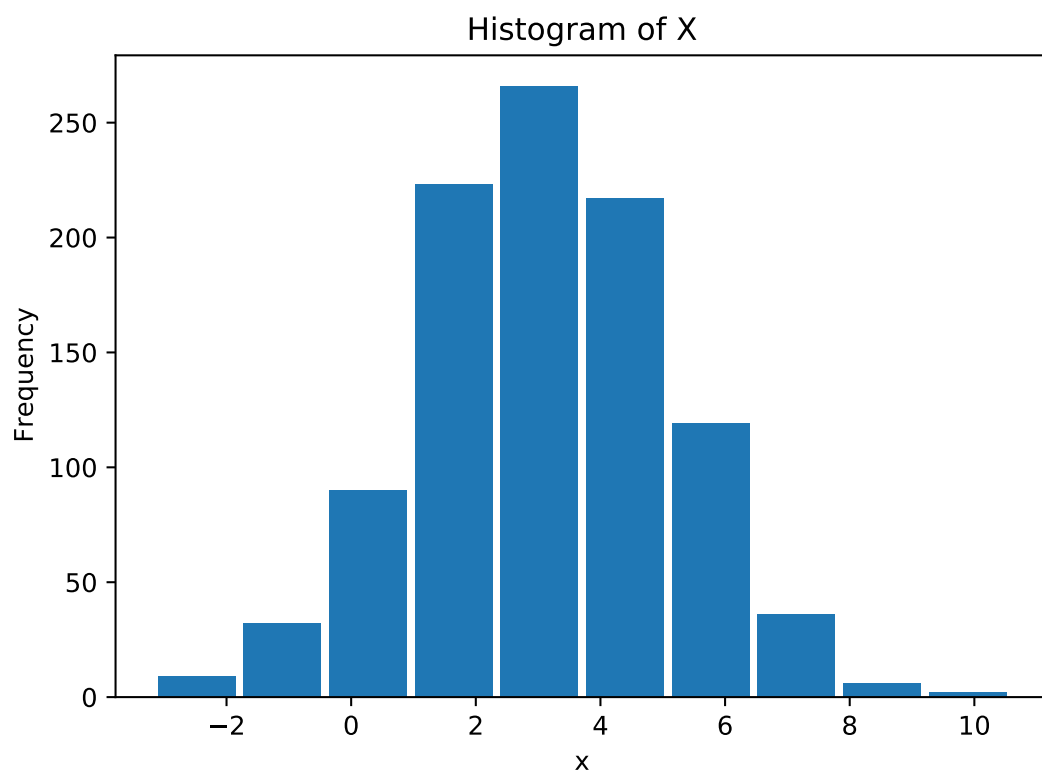**Various random numbers, Normal random numbers p.16**

```
import matplotlib.pyplot as plt
import numpy as np


x=np.random.normal(size=1000, loc=3, scale=2) # loc = mean , scale =sd


plt.hist(x, rwidth=0.9)
```

```
## (array([  9.,  32.,  90., 223., 266., 217., 119.,  36.,   6.,   2.]), array([-3.16908624, -
1.79433478, -0.41958332,  0.95516814,  2.32991959,
##         3.70467105,  5.07942251,  6.45417397,  7.82892543,  9.20367689,
##         10.57842834]), <BarContainer object of 10 artists>)
```

```
plt.xlabel("x")
plt.ylabel("Frequency")
plt.title("Histogram of X")
```

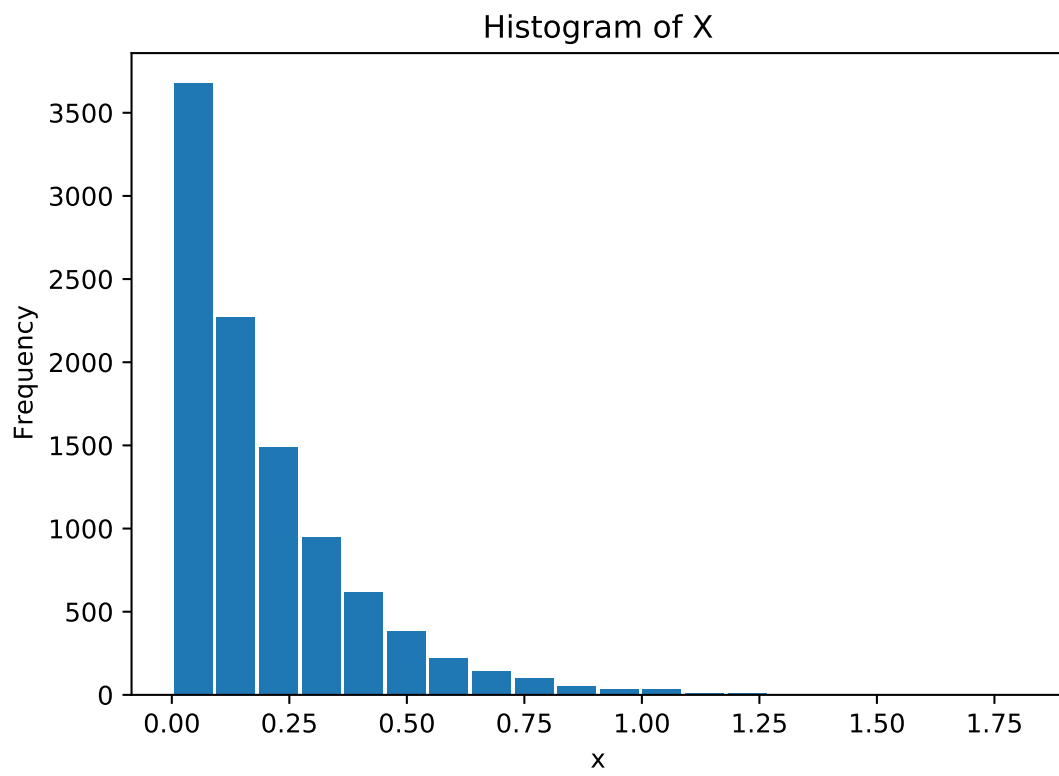## Various random numbers, Exponential random numbers p.17

```python
import matplotlib.pyplot as plt
import numpy as np

x=np.random.exponential(size=10000,scale=1/5) # meaning lambda=5

plt.hist(x,rwidth=0.9,bins=20)
```

```
## (array([3.675e+03, 2.272e+03, 1.487e+03, 9.460e+02, 6.190e+02, 3.790e+02,
##         2.210e+02, 1.390e+02, 1.010e+02, 5.400e+01, 3.600e+01, 3.300e+01,
##         1.200e+01, 1.000e+01, 5.000e+00, 4.000e+00, 3.000e+00, 3.000e+00,
##            0.000e+00, 1.000e+00]), array([2.00490341e-05, 9.06910246e-02, 1.81362000e-01, 2.72032976e-01,
##         3.62703951e-01, 4.53374927e-01, 5.44045902e-01, 6.34716878e-01,
##         7.25387853e-01, 8.16058829e-01, 9.06729804e-01, 9.97400780e-01,
##         1.08807176e+00, 1.17874273e+00, 1.26941371e+00, 1.36008468e+00,
##         1.45075566e+00, 1.54142663e+00, 1.63209761e+00, 1.72276858e+00,
##         1.81343956e+00]), <BarContainer object of 20 artists>)
```

```python
plt.xlabel("x")
plt.ylabel("Frequency")
plt.title("Histogram of X")
```

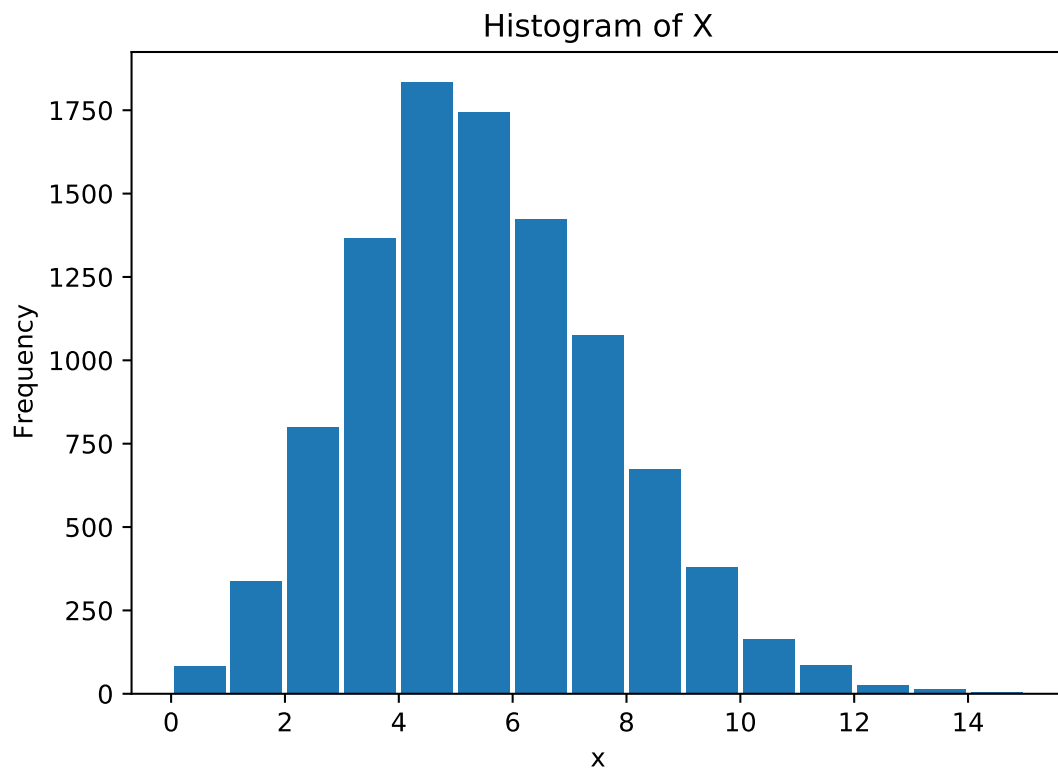Histogram of X

Various random numbers, Poisson random numbers p.18

```python
import matplotlib.pyplot as plt
import numpy as np

x=np.random.poisson(size=10000,lam=5) # meaning lambda=5

plt.hist(x,rwidth=0.9,bins=15)
```

```
## (array([  82.,  337.,  799., 1366., 1833., 1745., 1422., 1076.,  672.,
##         378.,  162.,   85.,   26.,   14.,    3.]), array([ 0.,  1.,  2.,  3.,  4.,  5.,  6.,  7.,  8.,  9., 10., 11., 12.,
##         13., 14., 15.]), <BarContainer object of 15 artists>)
```

```python
plt.xlabel("x")
plt.ylabel("Frequency")
plt.title("Histogram of X")
```

```
"Done, Lecture A5. Simulation 2 "
```

```
## [1] "Done, Lecture A5. Simulation 2 "
```