e-11

March 11, 2025

[1]:
```
import numpy as np
```

[56]:
```
rng = np.random.default_rng() # should create a special class(obj) for using␣
↪from Generator

# because of seed .
```

[57]:
```
rng.integers(10) #low
```

[57]:
```
np.int64(6)
```

[58]:
```
rng.integers(0, 20) #low - hight
```

[58]:
```
np.int64(18)
```

[59]:
```
rng.integers(0, 20, (2, 2)) #low - hight - shape
```

[59]:
```
array([[ 9,  4],
       [17,  3]])
```

[60]:
```
rng.integers(0, 20, (3, 3), endpoint=True) #low - hight - shape - endpoint
```

[60]:
```
array([[19, 12,  5],
       [19,  3,  0],
       [ 4, 15, 19]])
```

[61]:
```
rng.random(2) # float
```

[61]:
```
array([0.79883856, 0.73026204])
```

[62]:
```
rng.random((2, 2)) # float with dims
```

[62]:
```
array([[0.12500965, 0.74398838],
       [0.35928985, 0.95607644]])
```

[63]:
```
a = np.array([
    [1,  2, 3],
```

```
    [4,  5, 6],
    [7,  8, 9]
])
```

[64]:
```
rng.choice(a) # random choice
```

[64]:
```
array([1, 2, 3])
```

[65]:
```
rng.choice(a, size=2) # with size
```

[65]:
```
array([[1, 2, 3],
       [1, 2, 3]])
```

[66]:
```
rng.choice(a, size=(2, 2)) # with shape size
```

[66]:
```
array([[[1, 2, 3],
        [4, 5, 6]],

       [[7, 8, 9],
        [4, 5, 6]]])
```

[67]:
```
rng.choice(a, size=(2, 2), replace=False) # error
```

```
---------------------------------------------------------------------------
ValueError                                Traceback (most recent call last)
Cell In[67], line 1
----> 1 rng.choice(a, size=(2, 2), replace=False)

File numpy\\random\\_generator.pyx:917, in numpy.random._generator.Generator.
 ↪choice()

ValueError: Cannot take a larger sample than population when replace is False
```

[68]:
```
rng.choice(a, size=(2, 1), replace=False) # with true shape
```

[68]:
```
array([[[1, 2, 3]],

       [[7, 8, 9]]])
```

[69]:
```
rng.choice(a, size=None, replace=True, p=None, axis=0, shuffle=True)

# p is chance for choice for each item
```

[69]:
```
array([7, 8, 9])
```

[70]:
```
rng.bytes(3)
```

[70]:
```
b'\xaf\xc8\xf7'
```

[71]:
```
rng.shuffle(a)
a
```

[71]:
```
array([[7, 8, 9],
       [4, 5, 6],
       [1, 2, 3]])
```

[72]:
```
b = np.array([
    [1,  2, 3],
    [4,  5, 6],
    [7,  8, 9]
])
```

[73]:
```
rng.shuffle(b, axis=1)
b
```

[73]:
```
array([[2, 1, 3],
       [5, 4, 6],
       [8, 7, 9]])
```

[74]:
```
rng.permutation(10)
```

[74]:
```
array([9, 1, 6, 4, 8, 0, 3, 5, 7, 2])
```

[75]:
```
rng.permutation([1, 4, 9, 12, 15])
```

[75]:
```
array([ 9,  4, 15, 12,  1])
```

[76]:
```
c = np.array([
    [1,  2, 3],
    [4,  5, 6],
    [7,  8, 9]
])

rng.permutation(c, axis=1)
```

[76]:
```
array([[2, 1, 3],
       [5, 4, 6],
       [8, 7, 9]])
```

[77]:
```
rng.permutation(c, axis=0)
```

[77]:
```
array([[1, 2, 3],
       [4, 5, 6],
       [7, 8, 9]])
```

[ ]: