

$$rand() / m$$

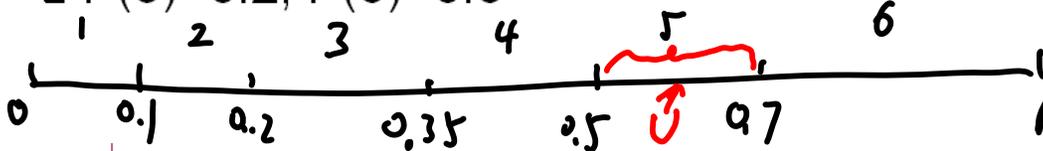
$$[0, 1, \dots, m-1]$$

A red bracket is under the first few elements of the array, and a blue bracket is under the last few elements.

$$(0.5 + rand()) / (RAND\_MAX + 1)$$



- $P(1)=0.1; P(2)=0.1; P(3)=0.15; P(4)=0.15$
- $P(5)=0.2; P(6)=0.3$



$$X = \begin{cases} x_0 & \text{if } U < p_0 \\ x_1 & \text{if } p_0 \leq U < p_0 + p_1 \\ \vdots & \\ x_j & \text{if } \sum_{i=0}^{j-1} p_i \leq U < \sum_{i=0}^j p_i \\ \vdots & \end{cases}$$

```

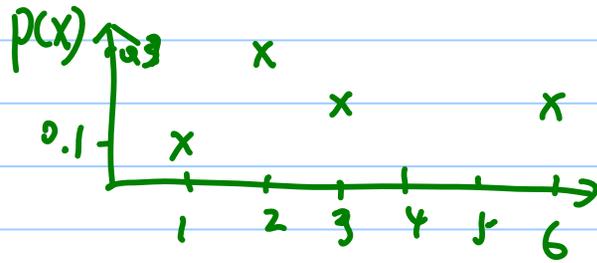
X = zeros(1, 1000);
for i = 1:1000,
    u = rand;
    if (u < 0.1) x = 1;
    else if (u < 0.2) x = 2;
    else if (u < 0.35) x = 3;
    else: x = 6;
    X(i) = x;
end
    
```

avg = mean(X);

[1, 2, 2, 4, 6, 5, 6, 2, 3, 3] simulate 10 samples

$$P(X=1) = ? \quad P(X=1) = \frac{1}{10}, \quad P(X=6) = \frac{2}{10}$$

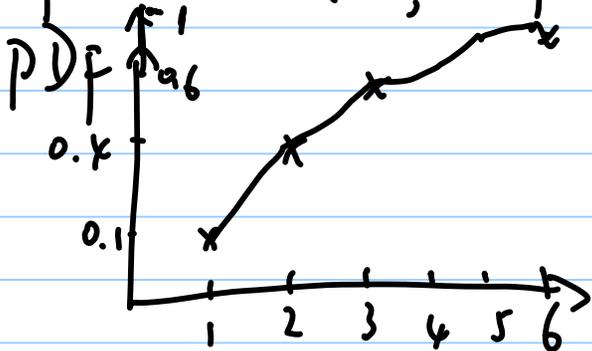
$$P(X=2) = \frac{3}{10}$$



PDF?

$P(X \leq x)$

$$P(X \leq 1) = \frac{1}{10}, \quad P(X \leq 2) = \frac{4}{10}, \quad P(X \leq 3) = \frac{6}{10}, \quad P(X \leq 6) = 1$$



$$P_0, P_1, \dots, P_{250} \leq \epsilon = 0.00001$$

if ( $U > \sum_{i=0}^{249} P_i$ )  $x = 250$ ;  $X = \text{zeros}(1, 1000)$ ;

$$F(x) = 1 - e^{-\lambda x}$$

$$F^{-1}(U) = -\ln(1 - U) / \lambda$$

for  $i = 1:1000$ ,

$\mu = \text{rand}$ ;

$x = -\log(1 - \mu) / \lambda$ ;

$X(i) = x$ ;

end