PRODUCTIONS D’ELEVES

Programme de simulation d’échantillonnage

Classe de 2nde

Cours de SNT

```python
import random

s=0
for i in range (50):
        y= random.randint(1,6)
        x= random.randint(1,6)
        s=x+y
        if s>=9:
            w=w+1
            print (s)
```

```python
import random

eff = 0

for i in range(1, 50):

    d1 = random.randint(1,6)
    d2 = random.randint(1,6)

    if d1 + d2 == 9 :
        eff = eff + 1

print ('frequence est    ', eff/50)
```

```
import random
r=random.randint[1,6]
q=random.randint[1,6]
for i in range(50):
    s=r+q
    if s
```

```python
import random
k=0
for i in range(1,51):
    r=random.randint(1,6)
    s=random.randint(1,6)
    t=r+s
    if t>=9:
        k=k+1
    else: k=k
    f=k/50

print(k)
```

```
# Licence:     <your licence>
while 50:
    import random
    r=random.randint(1,12)
    print(r)
    def lancerDeuxDes(nbDes,nbFaces):
        listeDesDes = [2]
        for i in range(2):
          d = lancerUnDe(6)
```

```python
import random

r = random.randint(1,6)
print(r)
m = random.randint(1,6)
print(m)
n = m+r

print(n)
if n ==9:
    print("Gagné")

else:
    print("perdu")
```

```python
import random

for i in range (1,2):
        r = random.randint(1,6)
        print(r)
        n = r+r

print(n)
if n == 9:
        print("Bien joué, vous avez gagné")

else:
        print("Dommage, vous avez perdu")
```

```
import random
for i in range (50):
    r=random.randint(2,12)
    print(r)
```

```python
import random

for i in range(49):
    r = random.randint(1,6)
    print(r)
    m = random.randint(1,6)
    print(m)
    n = m+r
    print(n)
    if n == 9:
        print("Bien joué, vous avez gagné")
    else:
            print("Dommage, vous avez perdu")
```

```
import random
a=0
for i in range (50):
    r=random.randint(1,6)
    f=random.randint(1,6)
    h=f+r
    print(h)
    if h>=9:
        a=a+1
print('fréquence=',a)
```

```python
import random
a=0

for i in range(50):
    r = random.randint(1,6)
    print(r)
    m = random.randint(1,6)
    print(m)
    n = m+r
    print(n)
    while n>=9:
        a=a+1
    if n >=9:
        print("Gagne")
    else:
        print("Perdu")
print("La fréquence=",a/50)
```

```
from random import*
for i in range (50):
def de():
        r=randint(1,6)
        return(r)
    a=de()
    print (a)
```

PRODUCTIONS D’ELEVES

Inégalité de concentration

Classe de Terminale

(2) $[\mu-3\sigma ; \mu+3\sigma]$

Pour $x_i \notin I$

$\mu-3\sigma \leq x_i \leq \mu+3\sigma$

$-3\sigma \geq |x_i-\mu| \geq 3\sigma$

$(x_i-\mu)^2 \geq 9\sigma^2$

$\sigma^2 = \frac{1}{n} \sum (x_i-\mu)^2$

$n\sigma^2 \geq (x_i-\mu)^2 \geq 9\sigma^2(n-k)$

$n\sigma^2 \geq 9\sigma^2(n-k)$

$n \geq 9n-9k$

$9k \geq 8n$

$\frac{9k}{8n} \geq 0$

$\frac{k}{n} \geq \frac{8}{9}$

Exercice 2:

(1) $P(\mu-2\sigma \leq X \leq \mu+2\sigma) \geq \frac{3}{4}$

$x_i \in [\mu-2\sigma ; \mu+2\sigma]$ $\mu-2\sigma \leq x_i \leq \mu+2\sigma$

$2\sigma \leq$

$n\sigma^2 = \sum_{x_i \in \Omega} P(X=x_i)(x_i-\mu)^2$

$\sum_{x \in I} P(X=x_i) \geq 0,75$

Pour $x_i \notin I$ $(x_i-\mu)^2 \geq 4\sigma^2$

$\sum_{x_i \notin I} (x_i-\mu)^2 \geq 4\sigma^2$

$\sum_{x_i \notin I} P(X=x_i)(x_i-\mu)^2 \geq \sum_{x_i \notin I} 4\sigma^2 P(X=x_i)$

$n\sigma^2 \geq 4\sigma^2 \sum_{x_i \notin I} P(X=x_i)$

$n\sigma^2 \geq 4\sigma^2(1-P(x \in I))$

$1 \geq 4-4P(X \in I)$

$P(X \in I) \geq \frac{4-1}{4}$

Samy
Youssef

$I = [\mu-3\sigma ; \mu+3\sigma]$

sachant que $\sigma^2 = \frac{1}{n} \sum_{x \in I} (x_i-\mu)^2$.

$\mu-3\sigma \leq x \leq \mu+3\sigma$

$-3\sigma \leq x-\mu \leq 3\sigma$

$(x-\mu)^2 \geq 9\sigma^2$

Ainsi $n\sigma^2 \geq \sum_{x \notin I} (x-\mu)^2 \geq 9\sigma^2(n-k)$

donc $n\sigma^2 \geq 9\sigma^2(n-k)$

$n \geq 9n-9k$

$-8n \geq -9k$

$9k \geq 8n$

$\frac{k}{n} \geq \frac{8}{9}$

$I = [\mu - \lambda\sigma ; \mu + \lambda\sigma]$

$\sigma^2 = \frac{1}{n} \sum (x_i - \mu)^2$

$P(X \in I) = 1 - P(X \notin I)$

~~$\sigma^2 = \sum P(x_i - \mu)^2$~~

ZERGOT Wiscole

$x_i \in I$

$\mu - \lambda\sigma \leq x_i \leq \mu + \lambda\sigma$

$-\lambda\sigma \leq x_i - \mu \leq \lambda\sigma$

$(x_i - \mu)^2 \leq \lambda^2 \sigma^2$

$x_i \notin I$

$(x_i - \mu)^2 \geq \lambda^2 \sigma^2$

~~$P(x_i - \mu)^2 \geq P \lambda^2 \sigma^2$~~

$P(X = x_i)(x_i - \mu)^2 \geq P(X = x_i) \lambda^2 \sigma^2$

$\sum_{x_i \notin I} P(X = x_i)(x_i - \mu)^2 \geq \sum_{x \notin I} P(X = x_i) \lambda^2 \sigma^2$

$\sum_{x_i \notin I} P(X = x_i)(x_i - \mu)^2 \geq \lambda^2 \sigma^2 \sum_{x_i \notin I} P(X = x_i)$.

$\sigma^2 \geq \sum_{x_i \notin I} P(X = x_i)(x_i - \mu)^2$

$\sigma^2 \geq \lambda^2 \sigma^2 P(X \notin I)$

~~$\sigma^2 \geq \lambda^2 \sigma^2 (1 - P(X \in I))$~~

~~$1 \geq \lambda^2 (1 - P(X \in I))$~~

~~$1 \geq \lambda^2 - \lambda^2 P(X \in I)$~~

~~$\frac{1}{\lambda^2} \geq \lambda^2 P(X \in I)$~~

$1 \geq \lambda^2 (1 - P(X \in I))$

$1 \geq \lambda^2 - \lambda^2 P(X \in I)$

$1 - \lambda^2 \geq -\lambda^2 P(X \in I)$

$\lambda^2 - 1 \leq \lambda^2 P(X \in I)$

$\frac{\lambda^2 - 1}{\lambda^2} \leq P(X \in I)$

$1 - \frac{1}{\lambda^2} \leq P(X \in I)$

Soit $\varepsilon > 0$, Posons $\lambda = \frac{\varepsilon n}{\sigma}$, Soit $n \in \mathbb{N}$

$P(|X - \mu| \leq \lambda\sigma) \geq 1 - \frac{1}{\lambda^2}$

$P(\frac{1}{n} |X - np| \leq \frac{\lambda\sigma}{n}) \geq 1 - \frac{1}{\lambda^2}$

$P(|\frac{X}{n} - p| \leq \frac{\lambda\sigma}{n}) \geq 1 - \frac{1}{\lambda^2}$

$1 - P(|f_n - p| \geq \frac{\lambda\sigma}{n}) \geq 1 - \frac{1}{\lambda^2}$, $\varepsilon = \frac{\lambda\sigma}{n}$ car $\lambda = \frac{\varepsilon n}{\sigma}$

$\Rightarrow P(|f_n - p| \geq \frac{\lambda\sigma}{n}) \leq \frac{1}{\lambda^2}$

$P(|f_n - p| \geq \varepsilon) \leq \frac{\sigma^2}{\varepsilon^2 n^2} = \frac{np(1-p)}{n^2 \varepsilon^2}$

$P(|f_n - p| \geq \varepsilon) \leq \frac{p(1-p)}{n \varepsilon^2}$

	1	2	3	4	5	6
1	2	3	4	5	6	7
2	3	4	5	6	7	8
3	4	5	6	7	8	9
4	5	6	7	8	9	10
5	6	7	8	9	10	11
6	7	8	9	10	11	1[illegible]

$\lim_{n \to +\infty} P(|f - p|)$

$n = 50$

$\varepsilon = 0{,}05$

$p = \frac{10}{36}$

~~$P(|f_n - p| \geq \varepsilon)$~~

$\frac{p(1-p)}{n\varepsilon^2} = \frac{\frac{10}{36}(1 - \frac{10}{36})}{50 \times 0{,}05^2} = \frac{\frac{65}{324}}{\frac{1}{8}}$

$\frac{p(1-p)}{n\varepsilon^2} = \frac{65 \times 8}{324} = \frac{130}{81} \approx 1{,}6$.

$P(|f - \frac{10}{36}| \leq \varepsilon) \geq 0{,}95$

$1 - P(|f - \frac{10}{36}| > \varepsilon) \geq 0{,}95$

$P(|f - \frac{10}{36}| < \varepsilon) \leq 0{,}05$

$0{,}05 = \frac{p(1-p)}{n\varepsilon^2}$

~~$\sqrt{\frac{n\, 0{,}05}{p(1-p)}} = \varepsilon$~~

~~$\varepsilon = \sqrt{\frac{50 \times 0{,}05}{\frac{10}{36}}}$~~

$\varepsilon = \sqrt{\frac{\frac{10}{36} \times \frac{26}{36}}{50 \times 0{,}05}}$

$\varepsilon \approx 0{,}28$

$I_1 = [0 ; 0{,}58]$

$P(f \in I_1) \geq 0{,}95$

SAMAR Rostom

Exercice 4 :

$$P(|f-p| > \varepsilon) \leq \frac{p(1-p)}{n\,\varepsilon^2}$$

$$P(f \in I) \geq 0,95$$

$$P\left(\frac{10}{36} - \varepsilon \leq f \leq \frac{10}{36} + \varepsilon\right) \geq 0,95$$

$$P\left(\left|f - \frac{10}{36}\right| \leq \varepsilon\right) \geq 0,95$$

$$1 - P\left(\left|f - \frac{10}{36}\right| > \varepsilon\right) \geq 0,95$$

$$P\left(\left|f - \frac{10}{36}\right| > \varepsilon\right) \leq 0,05$$

$$0,05 = \frac{\frac{10}{36} \times \frac{26}{36}}{50 \times \varepsilon^2}$$

$$\varepsilon = \sqrt{\frac{\frac{10}{36} \times \frac{26}{36}}{50 \times 0,05}}$$

$$\varepsilon = 0,28$$

$$I_1 \approx [0 ; 0,56]$$

$$P(f \in I_1) \geq 0,95$$

MERCI