

TP5_Sujet

February 13, 2024

1 TP5

1.1 Numpy et visualisation avec matplotlib

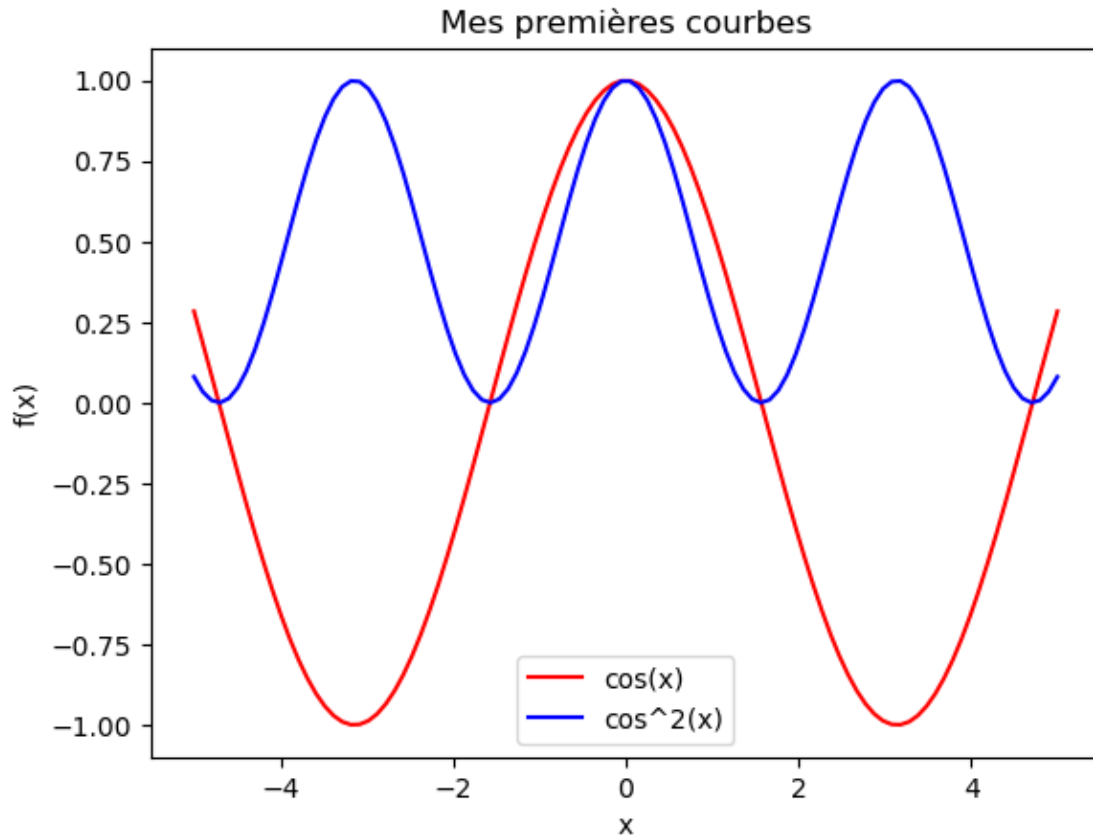
1.1.1 Exercice 1 : première courbe

```
[11]: %matplotlib inline
import numpy as np
import matplotlib as mpl
import matplotlib.pyplot as plt
from pydoc import help
```

- Tracer, sur un même graphique, le graphe des fonctions $\cos(x)$ et $\cos^2(x)$, pour 100 valeurs de x comprises entre -5 et 5.
- Ajouter les légendes et les propriétés de style de manière à ce que le résultat soit conforme à ce qui vous est donné ci-dessous. Il est obligatoire d'utiliser numpy et matplotlib.

```
[2]: # A Faire ...
```

```
[2]: Text(0.5, 1.0, 'Mes premières courbes')
```

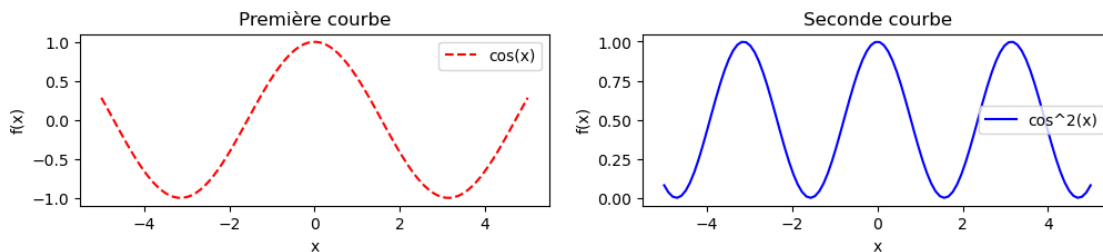


- Tracer les mêmes courbes, mais cette fois-ci chacune sur un schéma sur deux zones côte à côte comme sur le schéma ci-dessous:

```
[3]: fig, ax = plt.subplots(ncols=2, nrows=1, figsize=(12, 2))

# A Compléter ...
```

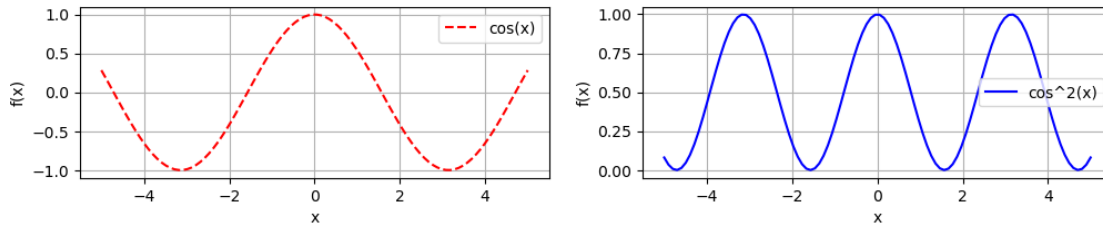
```
[3]: Text(0.5, 1.0, 'Seconde courbe')
```



- Reprenez les schémas ci-dessus, mais en appliquant une grille sur la figure.

```
[4]: fig, ax = plt.subplots(ncols=2, nrows=1, figsize=(12, 2))

# A Compléter ...
```



1.1.2 Exercice 2

On va travailler sur un tableau de notes.

Sur chaque ligne du tableau on met les résultats d'un étudiant qui a effectué 20 tests successifs.

Le tableau comprend les résultats de 50 étudiants (un par ligne).

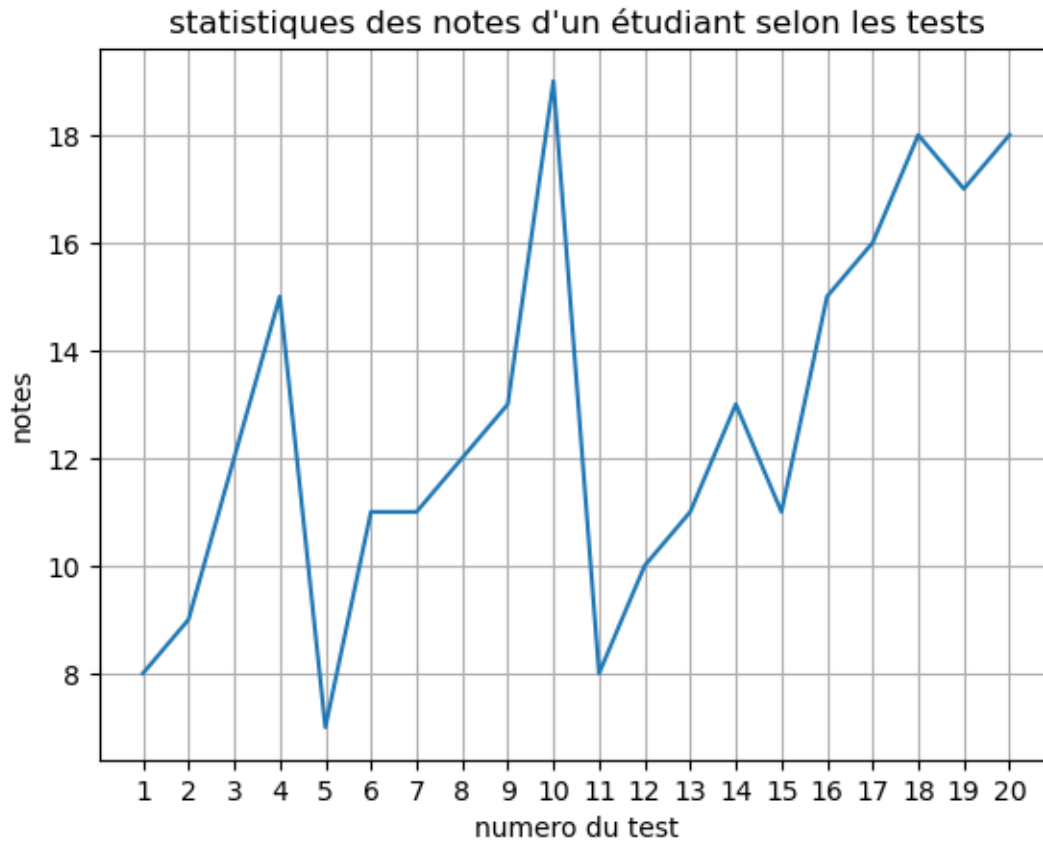
```
[12]: import numpy as np
import matplotlib as mpl
import matplotlib.pyplot as plt
import random
```

Dans un premier temps, on travaille avec les résultats d'un premier étudiant:
`etud1=[8,9,12,15,7,11,11,12,13,19,8,10,11,13,11,15,16,18, 17, 18]`

Transformer ce tableau en array numpy, puis tracer l'évolution des résultats de cet étudiant au fil des tests comme sur le graphique ci-dessous.

```
[6]: etud1=[8,9,12,15,7,11,11,12,13,19,8,10,11,13,11,15,16,18, 17, 18]

# A Compléter ...
```



On donne ensuite une liste de listes correspondant donc à 50 étudiants (20 notes par étudiant). Transformer ce tableau en array numpy.

```
[13]: t=[[ 4,  4, 13, 9, 11,  8, 11, 8,  3,  6,  6, 12,  5,  9,  6,  8,
          3, 11, 10, 11],
         [5, 11, 9,  2,  6,  7,  6,  6, 11, 11,  1, 10, 11,  7, 14, 10,
          9, 12,  7,  5],
         [15, 16, 12, 10, 13, 10, 11, 14,  6,  6, 13,  8, 11, 12, 10,  9,
          10, 12, 12, 12],
         [12, 17, 14, 13, 12, 17, 13, 14, 15, 16, 15, 15, 12, 16, 13, 20,
          12, 14, 14, 19],
         [6,  7,  5, 13,  6,  9, 10, 10,  9,  8,  7,  4,  6,  6, 13, 13,
          10,  4, 16, 13],
         [ 5,  4,  6,  9, 11, 13,  6,  7, 10,  8,  6, 13, 11, 11, 11, 15,
          10, 10,  9,  8],
         [11,  7, 12, 10, 10,  6,  5,  8, 10,  3,  9, 11,  8,  7, 11,  4,
          6, 12,  4,  7],
         [10, 10, 11,  5,  9, 10, 16,  5,  5,  4, 13, 14, 12,  2, 16,  5,
          11,  8,  9,  6],
         [ 2,  5,  7,  3,  4, 16, 12,  8,  5,  9, 10, 10,  9,  3,  4,  3,
```

10, 7, 12, 10],
 [4, 10, 13, 8, 8, 7, 10, 3, 8, 6, 0, 15, 12, 11, 12, 15,
 11, 13, 15, 4],
 [15, 11, 10, 16, 14, 17, 19, 17, 16, 16, 17, 14, 12, 17, 12, 14,
 17, 17, 13, 12],
 [6, 7, 4, 14, 8, 11, 9, 7, 12, 6, 8, 11, 10, 9, 13, 9,
 12, 9, 10, 10],
 [20, 14, 17, 17, 16, 13, 17, 15, 17, 14, 10, 17, 14, 13, 19, 15,
 13, 19, 15, 18],
 [3, 14, 11, 3, 11, 8, 2, 11, 4, 5, 12, 17, 3, 3, 9, 13,
 12, 3, 5, 10],
 [5, 10, 10, 11, 9, 12, 2, 5, 2, 12, 9, 9, 1, 4, 10, 9,
 10, 1, 10, 13],
 [10, 8, 8, 19, 13, 6, 5, 16, 16, 10, 17, 10, 3, 15, 13, 14,
 5, 14, 12, 9],
 [9, 10, 10, 10, 13, 10, 12, 7, 10, 10, 11, 15, 5, 7, 0, 7,
 12, 10, 13, 13],
 [6, 7, 2, 11, 1, 11, 11, 11, 6, 5, 10, 14, 12, 12, 9, 13,
 18, 10, 18, 20],
 [14, 13, 19, 10, 17, 15, 10, 15, 12, 13, 7, 8, 13, 11, 9, 18,
 13, 13, 5, 18],
 [4, 1, 6, 17, 4, 7, 5, 19, 11, 5, 7, 18, 16, 8, 9, 11,
 10, 10, 1, 12],
 [12, 12, 12, 6, 6, 15, 11, 12, 12, 10, 11, 11, 12, 11, 9, 11,
 5, 7, 12, 12],
 [7, 5, 13, 11, 9, 11, 6, 10, 12, 10, 17, 10, 5, 4, 9, 11,
 10, 3, 11, 5],
 [10, 6, 10, 4, 8, 4, 5, 4, 4, 8, 7, 9, 4, 9, 5, 8,
 4, 2, 7, 3],
 [14, 9, 3, 13, 5, 11, 6, 12, 10, 7, 12, 6, 13, 8, 1, 5,
 14, 13, 12, 11],
 [10, 4, 5, 3, 7, 15, 8, 0, 7, 8, 0, 5, 4, 12, 8, 4,
 13, 12, 14, 11],
 [11, 8, 11, 11, 10, 14, 2, 11, 10, 12, 10, 9, 10, 8, 9, 12,
 10, 10, 7, 7],
 [5, 4, 5, 13, 7, 7, 9, 10, 6, 11, 13, 12, 8, 9, 3, 1,
 10, 9, 11, 14],
 [11, 11, 11, 10, 10, 10, 7, 12, 7, 14, 6, 13, 11, 12, 8, 7,
 12, 12, 8, 11],
 [11, 10, 8, 6, 11, 8, 8, 14, 11, 12, 12, 11, 11, 10, 10, 8,
 13, 9, 5, 11],
 [17, 17, 14, 15, 13, 12, 15, 15, 15, 16, 16, 12, 14, 15, 14, 11,
 6, 13, 12, 10],
 [16, 13, 15, 13, 11, 10, 14, 12, 10, 12, 16, 16, 16, 16, 10, 10,
 10, 11, 11, 11],
 [12, 12, 8, 8, 9, 9, 15, 9, 9, 9, 9, 7, 13, 10, 9, 14,
 5, 12, 10, 5],

```

[16, 9, 10, 8, 17, 13, 16, 13, 7, 9, 17, 10, 16, 11, 7, 11,
 10, 6, 12, 12],
[10, 5, 5, 6, 7, 2, 10, 13, 17, 12, 10, 12, 16, 10, 13, 5,
 10, 7, 10, 8],
[ 3, 12, 8, 9, 9, 12, 2, 12, 3, 7, 1, 10, 6, 9, 5, 7,
 2, 5, 15, 10],
[14, 12, 9, 12, 9, 8, 12, 10, 9, 13, 13, 8, 2, 13, 11, 11,
 13, 7, 11, 11],
[ 11, 8, 9, 14, 16, 3, 16, 4, 5, 13, 12, 11, 9, 7, 7, 16,
 14, 10, 16, 6],
[11, 4, 5, 10, 4, 5, 10, 10, 14, 4, 12, 6, 7, 9, 16, 8,
 10, 9, 9, 13],
[16, 18, 10, 18, 11, 12, 19, 13, 4, 6, 16, 17, 17, 10, 7, 16,
 10, 10, 3, 1],
[ 7, 12, 9, 12, 9, 12, 4, 13, 13, 3, 12, 9, 14, 19, 12, 0,
 3, 6, 13, 13],
[14, 10, 10, 9, 6, 12, 18, 18, 14, 14, 10, 18, 10, 10, 10, 12,
 19, 5, 14, 0],
[20, 20, 1, 7, 5, 15, 5, 8, 9, 8, 7, 8, 8, 16, 3, 3,
 3, 13, 3, 6],
[ 4, 6, 1, 2, 13, 2, 9, 6, 10, 12, 12, 2, 4, 10, 14, 10,
 6, 15, 10, 5],
[ 3, 7, 3, 4, 10, 3, 10, 13, 7, 5, 3, 4, 2, 8, 11, 8,
 9, 6, 7, 3],
[10, 14, 9, 13, 6, 5, 8, 4, 4, 11, 6, 11, 12, 11, 10, 4,
 7, 8, 9, 11],
[ 8, 10, 2, 8, 5, 10, 10, 2, 7, 7, 6, 14, 13, 4, 7, 8,
 6, 8, 12, 3],
[ 8, 12, 7, 9, 14, 12, 12, 12, 13, 13, 9, 7, 4, 10, 8, 11,
 6, 15, 3, 15],
[ 7, 11, 7, 11, 6, 7, 10, 8, 1, 14, 12, 13, 10, 8, 15, 12,
 7, 10, 14, 4],
[11, 9, 14, 5, 14, 6, 12, 8, 12, 10, 9, 8, 9, 4, 4, 15,
 11, 10, 12, 7],
[ 10, 6, 10, 12, 5, 4, 13, 8, 12, 12, 13, 12, 17, 8, 9, 5,
 10, 13, 12, 13]]

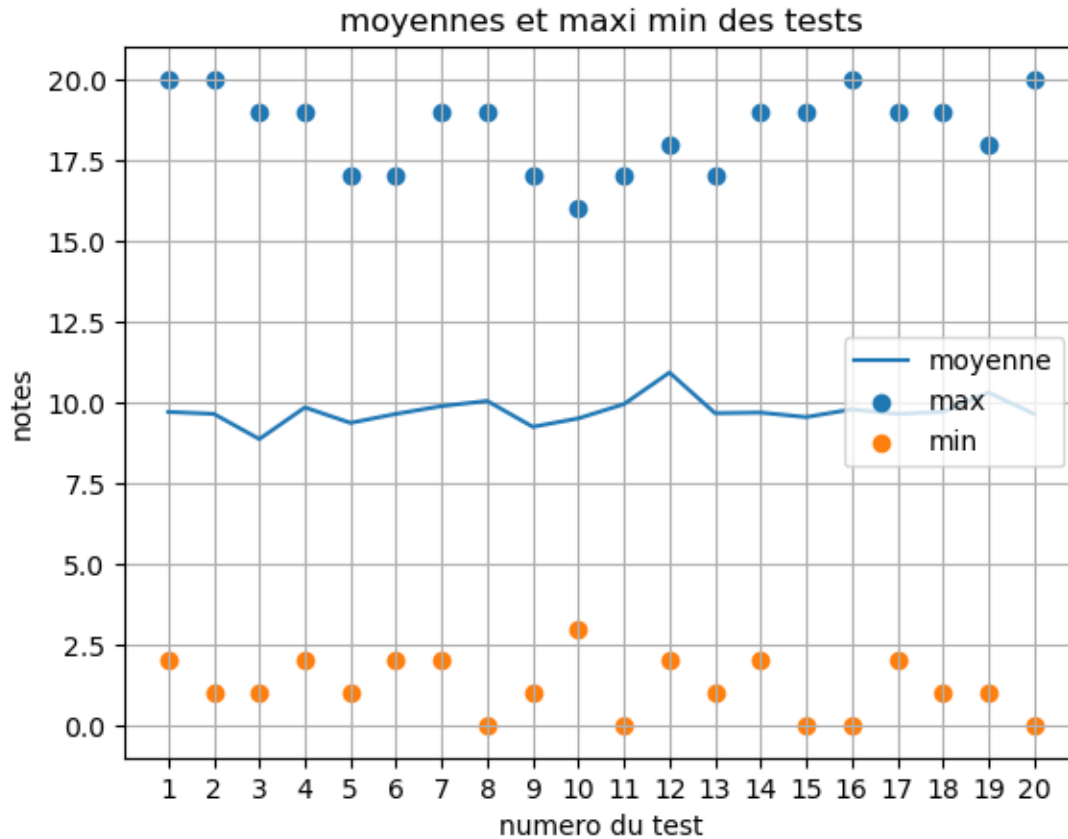
```

Calculer le tableau des moyennes des notes des tests des étudiants à chaque test. Faire un graphique de ces résultats comme ci-dessous.

```

[8]: tab=np.array(t)
     # A Compléter ...

```



Compter combien d'étudiants ont la moyenne à chaque test.

Pour chaque étudiant, compter à combien des tests l'étudiant a eu la moyenne.

```
[17]: # même exercice que TP précédant
      # A compléter ...

      print("nombre d'étudiants ayant la moyenne pour chaque test \n ", t)
      print()
      print("nombre de tests où il a eu la moyenne pour chaque étudiant \n",res)
```

nombre d'étudiants ayant la moyenne pour chaque test

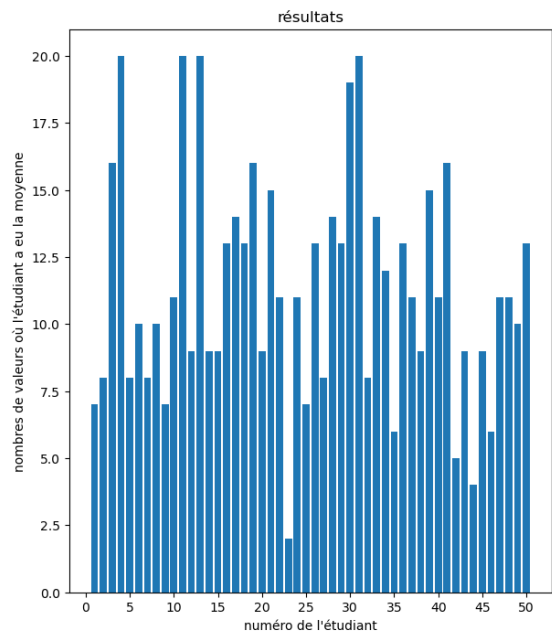
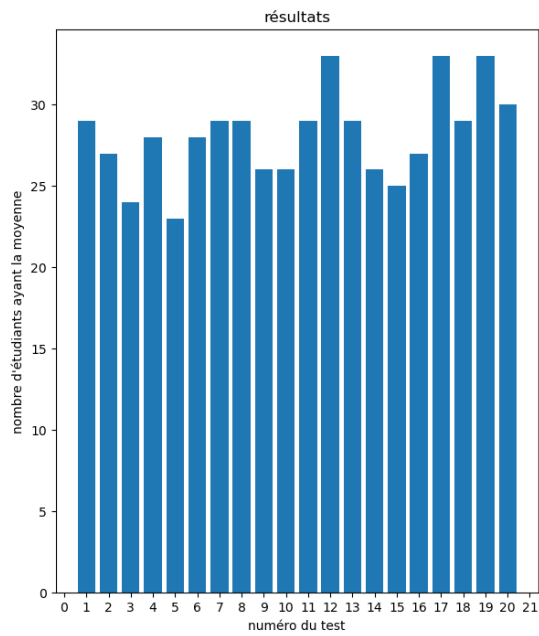
```
[29 27 24 28 23 28 29 29 26 26 29 33 29 26 25 27 33 29 33 30]
```

nombre de tests où il a eu la moyenne pour chaque étudiant

```
[ 7  8 16 20  8 10  8 10  7 11 20  9 20  9  9 13 14 13 16  9 15 11  2 11
  7 13  8 14 13 19 20  8 14 12  6 13 11  9 15 11 16  5  9  4  9  6 11 11
 10 13]
```

Faire un graphique avec les deux histogrammes correspondants aux données précédentes (t et res).

```
[19]: # A Faire ...
```



[]: