

# Compte rendu TP1

Réalisé Par :

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Sous l'encadrement de :

Monsieur ZOUAIRI Arafet

# Les captures d'exécution :

```
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL JUPYTER
PS C:\Users\asus\Desktop\3 IDL\TP M1> c:; cd 'c:\Users\asus\Desktop\3 IDL\TP M1'; & 'C:\Users\asus\AppData\Local\Programs\Python\Python311\python.exe' 'c:\Users\asus\.vscode\extensions\ms-python.python-2022.18.2\pythonFiles\lib\python\debugpy\adapter\..\debugpy\launcher' '54110' '--' 'c:\Users\asus\Desktop\3 IDL\TP M1\tp1.py'
ID      Product
0 1      Peaches
1 2      Vegetable_Oil
2 2      Frozen_Corn
3 3      Plums
4 4      Pancake_Mix
5 5      Cheese
6 6      Cauliflower
7 7      2pct_Milk
8 8 98pct_Fat_Free_Hamburger
9 8      Potato_Chips
ID      Product
1 2      Vegetable_Oil
2 2      Frozen_Corn
3 3      Plums
4 4      Pancake_Mix
5 5      Cheese
6 6      Cauliflower
7 7      2pct_Milk
8 8 98pct_Fat_Free_Hamburger
9 8      Potato_Chips
10 8     Sesame_Oil
```

```
100_Watt_Lightbulb 2pct_Milk 40_Watt_Lightbulb ... Wood_Polish flav_Fruit_Bars flav_Ice
1 0.0 0.0 0.0 ... 0.0 0.0 0.0
2 0.0 0.0 0.0 ... 0.0 0.0 0.0
3 0.0 0.0 0.0 ... 0.0 0.0 0.0
4 0.0 0.0 0.0 ... 0.0 0.0 0.0
5 0.0 0.0 0.0 ... 0.0 0.0 0.0
... ... ... ... ...
1357 0.0 0.0 0.0 ... 0.0 0.0 0.0
1358 0.0 0.0 0.0 ... 0.0 0.0 0.0
1359 0.0 1.0 1.0 ... 0.0 1.0 0.0
1360 1.0 0.0 0.0 ... 0.0 1.0 1.0
1361 0.0 0.0 0.0 ... 0.0 0.0 0.0

[1360 rows x 303 columns]
Product 100_Watt_Lightbulb 2pct_Milk 40_Watt_Lightbulb ... Wood_Polish flav_Fruit_Bars flav_Ice
ID      ...
1 0 0 0 ... 0 0 0
2 0 0 0 ... 0 0 0
3 0 0 0 ... 0 0 0
4 0 0 0 ... 0 0 0
5 0 0 0 ... 0 0 0
... ... ... ... ...
1357 0 0 0 ... 0 0 0
1358 0 0 0 ... 0 0 0
1359 0 1 1 ... 0 1 0
1360 1 0 0 ... 0 1 1
1361 0 0 0 ... 0 0 0

[1360 rows x 303 columns]
```

```

C 1
      0 Support
0      100_Watt_Lightbulb 41
1      2pct_Milk 149
3      60_Watt_Lightbulb 51
4      75_Watt_Lightbulb 43
5      98pct_Fat_Free_Hamburger 127
..      ...
295     White_Zinfandel_Wine 42
296     Whole_Corn 42
298     Whole_Milk 48
301     flav_Fruit_Bars 53
302     flav_Ice 51

```

[192 rows x 2 columns]

```

C 2
      0      1 Support
305     2pct_Milk 98pct_Fat_Free_Hamburger 52
315     2pct_Milk Apples 40
316     2pct_Milk Aspirin 47
320     2pct_Milk Bananas 43
330     2pct_Milk Bologna 39
...      ...
45490    Tomatoes White_Bread 55
45532    Toothpaste Wheat_Bread 47
45533    Toothpaste White_Bread 65
45677     Waffles White_Bread 37
45698    Wheat_Bread White_Bread 59

```

[270 rows x 3 columns]

```

Regle : [('2pct_Milk',)] -> [('98pct_Fat_Free_Hamburger',)] With confidence [0.34899329]
Regle : [('2pct_Milk',)] -> [('Apples',)] With confidence [0.26845638]
Regle : [('2pct_Milk',)] -> [('Aspirin',)] With confidence [0.31543624]
Regle : [('2pct_Milk',)] -> [('Bananas',)] With confidence [0.2885906]
Regle : [('2pct_Milk',)] -> [('Bologna',)] With confidence [0.26174497]
Regle : [('2pct_Milk',)] -> [('Canned_Tuna',)] With confidence [0.26845638]
Regle : [('2pct_Milk',)] -> [('Cantaloupe',)] With confidence [0.24832215]
Regle : [('2pct_Milk',)] -> [('Cola',)] With confidence [0.36912752]
Regle : [('2pct_Milk',)] -> [('Cream_Cheese',)] With confidence [0.28187919]
Regle : [('2pct_Milk',)] -> [('Domestic_Beer',)] With confidence [0.29530201]
Regle : [('2pct_Milk',)] -> [('Eggs',)] With confidence [0.47651007]
Regle : [('2pct_Milk',)] -> [('French_Fries',)] With confidence [0.26845638]
Regle : [('2pct_Milk',)] -> [('Frozen_Shrimp',)] With confidence [0.25503356]
Regle : [('2pct_Milk',)] -> [('Garlic',)] With confidence [0.26174497]
Regle : [('2pct_Milk',)] -> [('Hair_Conditioner',)] With confidence [0.26174497]
Regle : [('2pct_Milk',)] -> [('Hamburger_Buns',)] With confidence [0.25503356]
Regle : [('2pct_Milk',)] -> [('Hot_Dog_Buns',)] With confidence [0.26845638]
Regle : [('2pct_Milk',)] -> [('Hot_Dogs',)] With confidence [0.3557047]
Regle : [('2pct_Milk',)] -> [('Mushrooms',)] With confidence [0.24161074]
Regle : [('2pct_Milk',)] -> [('Onions',)] With confidence [0.37583893]
Regle : [('2pct_Milk',)] -> [('Orange_Juice',)] With confidence [0.29530201]
Regle : [('2pct_Milk',)] -> [('Oranges',)] With confidence [0.2885906]
Regle : [('2pct_Milk',)] -> [('Pancake_Mix',)] With confidence [0.25503356]
Regle : [('2pct_Milk',)] -> [('Pepperoni_Pizza_Frozen',)] With confidence [0.31543624]
Regle : [('2pct_Milk',)] -> [('Plums',)] With confidence [0.24161074]
Regle : [('2pct_Milk',)] -> [('Popcorn_Salt',)] With confidence [0.30201342]
Regle : [('2pct_Milk',)] -> [('Potato_Chips',)] With confidence [0.40939597]
Regle : [('2pct_Milk',)] -> [('Potatoes',)] With confidence [0.34899329]
Regle : [('2pct_Milk',)] -> [('Raisins',)] With confidence [0.29530201]
Regle : [('2pct_Milk',)] -> [('Ramen_Noodles',)] With confidence [0.28187919]
Regle : [('2pct_Milk',)] -> [('Salsa_Dip',)] With confidence [0.23489933]
Regle : [('2pct_Milk',)] -> [('Salt',)] With confidence [0.24832215]
Regle : [('2pct_Milk',)] -> [('Sandwich_Bags',)] With confidence [0.26845638]
Regle : [('2pct_Milk',)] -> [('Sugar_Cookies',)] With confidence [0.26845638]
Regle : [('2pct_Milk',)] -> [('Sweet_Relish',)] With confidence [0.37583893]
Regle : [('2pct_Milk',)] -> [('Toilet_Paper',)] With confidence [0.32214765]

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Regle : [('2pct_Milk',)] -> [('Salt',)] With confidence [0.24832215]
Regle : [('2pct_Milk',)] -> [('Sandwich_Bags',)] With confidence [0.26845638]
Regle : [('2pct_Milk',)] -> [('Sugar_Cookies',)] With confidence [0.26845638]
Regle : [('2pct_Milk',)] -> [('Sweet_Relish',)] With confidence [0.37583893]
Regle : [('2pct_Milk',)] -> [('Toilet_Paper',)] With confidence [0.32214765]
Regle : [('2pct_Milk',)] -> [('Tomatoes',)] With confidence [0.29530201]
Regle : [('2pct_Milk',)] -> [('Toothpaste',)] With confidence [0.39597315]
Regle : [('2pct_Milk',)] -> [('Waffles',)] With confidence [0.24832215]
Regle : [('2pct_Milk',)] -> [('Wheat_Bread',)] With confidence [0.38926174]
Regle : [('2pct_Milk',)] -> [('White_Bread',)] With confidence [0.46979866]
Regle : [('98pct_Fat_Free_Hamburger',)] -> [('Aspirin',)] With confidence [0.2992126]
Regle : [('98pct_Fat_Free_Hamburger',)] -> [('Bologna',)] With confidence [0.28346457]
Regle : [('98pct_Fat_Free_Hamburger',)] -> [('Cola',)] With confidence [0.32283465]
Regle : [('98pct_Fat_Free_Hamburger',)] -> [('Eggs',)] With confidence [0.48818898]
Regle : [('98pct_Fat_Free_Hamburger',)] -> [('Hamburger_Buns',)] With confidence [0.51968504]
Regle : [('98pct_Fat_Free_Hamburger',)] -> [('Hot_Dogs',)] With confidence [0.34645669]
Regle : [('98pct_Fat_Free_Hamburger',)] -> [('Onions',)] With confidence [0.31496063]
Regle : [('98pct_Fat_Free_Hamburger',)] -> [('Popcorn_Salt',)] With confidence [0.30708661]
Regle : [('98pct_Fat_Free_Hamburger',)] -> [('Potato_Chips',)] With confidence [0.46456693]
Regle : [('98pct_Fat_Free_Hamburger',)] -> [('Potatoes',)] With confidence [0.34645669]
Regle : [('98pct_Fat_Free_Hamburger',)] -> [('Raisins',)] With confidence [0.31496063]
Regle : [('98pct_Fat_Free_Hamburger',)] -> [('Ramen_Noodles',)] With confidence [0.31496063]
Regle : [('98pct_Fat_Free_Hamburger',)] -> [('Sugar_Cookies',)] With confidence [0.27559055]
Regle : [('98pct_Fat_Free_Hamburger',)] -> [('Sweet_Relish',)] With confidence [0.32283465]
Regle : [('98pct_Fat_Free_Hamburger',)] -> [('Toilet_Paper',)] With confidence [0.29133858]
Regle : [('98pct_Fat_Free_Hamburger',)] -> [('Tomatoes',)] With confidence [0.29133858]
Regle : [('98pct_Fat_Free_Hamburger',)] -> [('Toothpaste',)] With confidence [0.31496063]
Regle : [('98pct_Fat_Free_Hamburger',)] -> [('Wheat_Bread',)] With confidence [0.31496063]
Regle : [('98pct_Fat_Free_Hamburger',)] -> [('White_Bread',)] With confidence [0.52755906]
Regle : [('Apples',)] -> [('Eggs',)] With confidence [0.53424658]
Regle : [('Apples',)] -> [('Potato_Chips',)] With confidence [0.49315068]
Regle : [('Apples',)] -> [('Toothpaste',)] With confidence [0.54794521]
Regle : [('Apples',)] -> [('White_Bread',)] With confidence [0.54794521]
Regle : [('Aspirin',)] -> [('Cola',)] With confidence [0.40659341]
Regle : [('Aspirin',)] -> [('Domestic_Beer',)] With confidence [0.38461538]
Regle : [('Aspirin',)] -> [('Eggs',)] With confidence [0.57142857]
Regle : [('Aspirin',)] -> [('Hot_Dogs',)] With confidence [0.40659341]
```

```
Regle : [('Eggs',)] -> [('French_Fries',)] With confidence [0.25748503]
Regle : [('Eggs',)] -> [('Frozen_Shrimp',)] With confidence [0.22754491]
Regle : [('Eggs',)] -> [('Garlic',)] With confidence [0.24550898]
Regle : [('Eggs',)] -> [('Hair_Conditioner',)] With confidence [0.25149701]
Regle : [('Eggs',)] -> [('Hamburger_Buns',)] With confidence [0.25748503]
Regle : [('Eggs',)] -> [('Hot_Dog_Buns',)] With confidence [0.23353293]
Regle : [('Eggs',)] -> [('Hot_Dogs',)] With confidence [0.34730539]
Regle : [('Eggs',)] -> [('Mushrooms',)] With confidence [0.23353293]
Regle : [('Eggs',)] -> [('Onions',)] With confidence [0.32934132]
Regle : [('Eggs',)] -> [('Orange_Juice',)] With confidence [0.2754491]
Regle : [('Eggs',)] -> [('Orange_Flav_Fruit_Bars',)] With confidence [0.20958084]
Regle : [('Eggs',)] -> [('Oranges',)] With confidence [0.24550898]
Regle : [('Eggs',)] -> [('Pancake_Mix',)] With confidence [0.26347305]
Regle : [('Eggs',)] -> [('Pepperoni_Pizza_Frozen',)] With confidence [0.31736527]
Regle : [('Eggs',)] -> [('Plain_Bagels',)] With confidence [0.21556886]
Regle : [('Eggs',)] -> [('Plums',)] With confidence [0.25149701]
Regle : [('Eggs',)] -> [('Popcorn_Salt',)] With confidence [0.2994012]
Regle : [('Eggs',)] -> [('Potato_Chips',)] With confidence [0.39520958]
Regle : [('Eggs',)] -> [('Potatoes',)] With confidence [0.37125749]
Regle : [('Eggs',)] -> [('Raisins',)] With confidence [0.2994012]
Regle : [('Eggs',)] -> [('Ramen_Noodles',)] With confidence [0.2754491]
Regle : [('Eggs',)] -> [('Ravioli',)] With confidence [0.20958084]
Regle : [('Eggs',)] -> [('Salsa_Dip',)] With confidence [0.25149701]
Regle : [('Eggs',)] -> [('Salt',)] With confidence [0.26946108]
Regle : [('Eggs',)] -> [('Sandwich_Bags',)] With confidence [0.23353293]
Regle : [('Eggs',)] -> [('Sour_Cream',)] With confidence [0.24550898]
Regle : [('Eggs',)] -> [('Sugar_Cookies',)] With confidence [0.2994012]
Regle : [('Eggs',)] -> [('Sweet_Relish',)] With confidence [0.36526946]
Regle : [('Eggs',)] -> [('Toilet_Paper',)] With confidence [0.29341317]
Regle : [('Eggs',)] -> [('Tomatoes',)] With confidence [0.2994012]
Regle : [('Eggs',)] -> [('Toothpaste',)] With confidence [0.36526946]
Regle : [('Eggs',)] -> [('Waffles',)] With confidence [0.23952096]
Regle : [('Eggs',)] -> [('Wheat_Bread',)] With confidence [0.32934132]
Regle : [('Eggs',)] -> [('White_Bread',)] With confidence [0.4491018]
```

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Regle : [('Onions',)] -> [('White_Bread',)] With confidence [0.53211009]
Regle : [('Orange_Juice',)] -> [('Potatoes',)] With confidence [0.45454545]
Regle : [('Orange_Juice',)] -> [('Toothpaste',)] With confidence [0.46753247]
Regle : [('Orange_Juice',)] -> [('White_Bread',)] With confidence [0.54545455]
Regle : [('Orange_flav_Fruit_Bars',)] -> [('White_Bread',)] With confidence [0.58730159]
Regle : [('Oranges',)] -> [('White_Bread',)] With confidence [0.53947368]
Regle : [('Pancake_Mix',)] -> [('Potato_Chips',)] With confidence [0.46153846]
Regle : [('Pancake_Mix',)] -> [('Potatoes',)] With confidence [0.46153846]
Regle : [('Pancake_Mix',)] -> [('White_Bread',)] With confidence [0.58974359]
Regle : [('Pepperoni_Pizza_Frozen',)] -> [('Potato_Chips',)] With confidence [0.42553191]
Regle : [('Pepperoni_Pizza_Frozen',)] -> [('Potatoes',)] With confidence [0.37234043]
Regle : [('Pepperoni_Pizza_Frozen',)] -> [('Toothpaste',)] With confidence [0.37234043]
Regle : [('Pepperoni_Pizza_Frozen',)] -> [('Wheat_Bread',)] With confidence [0.37234043]
Regle : [('Pepperoni_Pizza_Frozen',)] -> [('White_Bread',)] With confidence [0.4893617]
Regle : [('Plums',)] -> [('Potato_Chips',)] With confidence [0.48684211]
Regle : [('Plums',)] -> [('White_Bread',)] With confidence [0.5]
Regle : [('Popcorn_Salt',)] -> [('Potato_Chips',)] With confidence [0.50574713]
Regle : [('Popcorn_Salt',)] -> [('Potatoes',)] With confidence [0.48275862]
Regle : [('Popcorn_Salt',)] -> [('Sweet_Relish',)] With confidence [0.44827586]
Regle : [('Popcorn_Salt',)] -> [('Toilet_Paper',)] With confidence [0.4137931]
Regle : [('Popcorn_Salt',)] -> [('Toothpaste',)] With confidence [0.4137931]
Regle : [('Popcorn_Salt',)] -> [('White_Bread',)] With confidence [0.55172414]
Regle : [('Potato_Chips',)] -> [('Potatoes',)] With confidence [0.37593985]
Regle : [('Potato_Chips',)] -> [('Raisins',)] With confidence [0.29323308]
Regle : [('Potato_Chips',)] -> [('Ramen_Noodles',)] With confidence [0.27819549]
Regle : [('Potato_Chips',)] -> [('Salt',)] With confidence [0.27819549]
Regle : [('Potato_Chips',)] -> [('Sour_Cream',)] With confidence [0.26315789]
Regle : [('Potato_Chips',)] -> [('Sugar_Cookies',)] With confidence [0.27819549]
Regle : [('Potato_Chips',)] -> [('Sweet_Relish',)] With confidence [0.34586466]
Regle : [('Potato_Chips',)] -> [('Toilet_Paper',)] With confidence [0.31578947]
Regle : [('Potato_Chips',)] -> [('Tomatoes',)] With confidence [0.33082707]
Regle : [('Potato_Chips',)] -> [('Toothpaste',)] With confidence [0.38345865]
Regle : [('Potato_Chips',)] -> [('Waffles',)] With confidence [0.27067669]
Regle : [('Potato_Chips',)] -> [('Wheat_Bread',)] With confidence [0.34586466]
Regle : [('Potato_Chips',)] -> [('White_Bread',)] With confidence [0.52631579]
Regle : [('Potatoes',)] -> [('Ramen_Noodles',)] With confidence [0.29661017]
Regle : [('Potatoes',)] -> [('Sweet_Relish',)] With confidence [0.41525424]
```

```
Regle : [('Potatoes',)] -> [('White_Bread',)] With confidence [0.49152542]
Regle : [('Raisins',)] -> [('Toothpaste',)] With confidence [0.46987952]
Regle : [('Raisins',)] -> [('Wheat_Bread',)] With confidence [0.42168675]
Regle : [('Raisins',)] -> [('White_Bread',)] With confidence [0.57831325]
Regle : [('Ramen_Noodles',)] -> [('Sweet_Relish',)] With confidence [0.42352941]
Regle : [('Ramen_Noodles',)] -> [('White_Bread',)] With confidence [0.52941176]
Regle : [('Salsa_Dip',)] -> [('White_Bread',)] With confidence [0.54411765]
Regle : [('Salt',)] -> [('Toothpaste',)] With confidence [0.5]
Regle : [('Salt',)] -> [('White_Bread',)] With confidence [0.58571429]
Regle : [('Sandwich_Bags',)] -> [('White_Bread',)] With confidence [0.5]
Regle : [('Shampoo',)] -> [('White_Bread',)] With confidence [0.68518519]
Regle : [('Sour_Cream',)] -> [('White_Bread',)] With confidence [0.57971014]
Regle : [('Sugar_Cookies',)] -> [('Tomatoes',)] With confidence [0.50666667]
Regle : [('Sugar_Cookies',)] -> [('Toothpaste',)] With confidence [0.50666667]
Regle : [('Sugar_Cookies',)] -> [('White_Bread',)] With confidence [0.64]
Regle : [('Sweet_Relish',)] -> [('Toilet_Paper',)] With confidence [0.35344828]
Regle : [('Sweet_Relish',)] -> [('Tomatoes',)] With confidence [0.35344828]
Regle : [('Sweet_Relish',)] -> [('Toothpaste',)] With confidence [0.43965517]
Regle : [('Sweet_Relish',)] -> [('Wheat_Bread',)] With confidence [0.36206897]
Regle : [('Sweet_Relish',)] -> [('White_Bread',)] With confidence [0.47413793]
Regle : [('Toilet_Paper',)] -> [('Toothpaste',)] With confidence [0.3960396]
Regle : [('Toilet_Paper',)] -> [('Wheat_Bread',)] With confidence [0.37623762]
Regle : [('Toilet_Paper',)] -> [('White_Bread',)] With confidence [0.5049505]
Regle : [('Tomatoes',)] -> [('Toothpaste',)] With confidence [0.46666667]
Regle : [('Tomatoes',)] -> [('Wheat_Bread',)] With confidence [0.43333333]
Regle : [('Tomatoes',)] -> [('White_Bread',)] With confidence [0.61111111]
Regle : [('Toothpaste',)] -> [('Wheat_Bread',)] With confidence [0.43518519]
Regle : [('Toothpaste',)] -> [('White_Bread',)] With confidence [0.60185185]
Regle : [('Waffles',)] -> [('White_Bread',)] With confidence [0.52857143]
Regle : [('Wheat_Bread',)] -> [('White_Bread',)] With confidence [0.56190476]
```



```

Regle : [('Potatoes',)] -> [('White_Bread',)] With confidence [0.49152542]
Regle : [('Raisins',)] -> [('Toothpaste',)] With confidence [0.46987952]
Regle : [('Raisins',)] -> [('Wheat_Bread',)] With confidence [0.42168675]
Regle : [('Raisins',)] -> [('White_Bread',)] With confidence [0.57831325]
Regle : [('Ramen_Noodles',)] -> [('Sweet_Relish',)] With confidence [0.42352941]
Regle : [('Ramen_Noodles',)] -> [('White_Bread',)] With confidence [0.52941176]
Regle : [('Salsa_Dip',)] -> [('White_Bread',)] With confidence [0.54411765]
Regle : [('Salt',)] -> [('Toothpaste',)] With confidence [0.5]
Regle : [('Salt',)] -> [('White_Bread',)] With confidence [0.58571429]
Regle : [('Sandwich_Bags',)] -> [('White_Bread',)] With confidence [0.5]
Regle : [('Shampoo',)] -> [('White_Bread',)] With confidence [0.68518519]
Regle : [('Sour_Cream',)] -> [('White_Bread',)] With confidence [0.57971014]
Regle : [('Sugar_Cookies',)] -> [('Tomatoes',)] With confidence [0.50666667]
Regle : [('Sugar_Cookies',)] -> [('Toothpaste',)] With confidence [0.50666667]
Regle : [('Sugar_Cookies',)] -> [('White_Bread',)] With confidence [0.64]
Regle : [('Sweet_Relish',)] -> [('Toilet_Paper',)] With confidence [0.35344828]
Regle : [('Sweet_Relish',)] -> [('Tomatoes',)] With confidence [0.35344828]
Regle : [('Sweet_Relish',)] -> [('Toothpaste',)] With confidence [0.43965517]
Regle : [('Sweet_Relish',)] -> [('Wheat_Bread',)] With confidence [0.36206897]
Regle : [('Sweet_Relish',)] -> [('White_Bread',)] With confidence [0.47413793]
Regle : [('Toilet_Paper',)] -> [('Toothpaste',)] With confidence [0.3960396]
Regle : [('Toilet_Paper',)] -> [('Wheat_Bread',)] With confidence [0.37623762]
Regle : [('Toilet_Paper',)] -> [('White_Bread',)] With confidence [0.5049505]
Regle : [('Tomatoes',)] -> [('Toothpaste',)] With confidence [0.46666667]
Regle : [('Tomatoes',)] -> [('Wheat_Bread',)] With confidence [0.43333333]
Regle : [('Tomatoes',)] -> [('White_Bread',)] With confidence [0.61111111]
Regle : [('Toothpaste',)] -> [('Wheat_Bread',)] With confidence [0.43518519]
Regle : [('Toothpaste',)] -> [('White_Bread',)] With confidence [0.60185185]
Regle : [('Waffles',)] -> [('White_Bread',)] With confidence [0.52857143]
Regle : [('Wheat_Bread',)] -> [('White_Bread',)] With confidence [0.56190476]

```

	antecedents	consequents	antecedent support	...	lift	leverage	conviction
870	(Wheat_Bread, 98pct_Fat_Free_Hamburger)	(White_Bread)	0.029412	...	7.555556	0.022967	8.808824
1147	(Toothpaste, Toilet_Paper)	(White_Bread)	0.029412	...	7.345679	0.022232	7.047059
1129	(Toilet_Paper, Potatoes)	(White_Bread)	0.028676	...	7.318772	0.021584	6.870882
1192	(Potato_Chips, 2pct_Milk, Toothpaste)	(White_Bread)	0.028676	...	7.318772	0.021584	6.870882
1074	(Hot_Dog_Buns, Sweet_Relish)	(Hot_Dogs)	0.036029	...	9.031422	0.026809	5.557537

[5 rows x 9 columns]

```
True
['Aspirin', 'Toothpaste', 'White_Bread']
['Aspirin', 'Potatoes', 'White_Bread']
['2pct_Milk', 'Aspirin', 'White_Bread']
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['Aspirin', 'White_Bread']
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['Aspirin', 'Toilet_Paper']
['Aspirin', '98pct_Fat_Free_Hamburger']
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['Potato_Chips', '2pct_Milk', 'Aspirin']
```

```

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['Aspirin', 'Potato_Chips', 'Eggs']
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['2pct_Milk', 'Aspirin', 'Eggs']
['Eggs', '2pct_Milk', 'Aspirin']
['Eggs', 'Potato_Chips', 'Aspirin']

```

	antecedents	consequents	antecedent support	consequent support	...	confidence	lift	leverage	convic
tion									
0	(2pct_Milk, Aspirin)	(White_Bread)	0.034559	0.119118	...	0.787234	6.608878	0.023089	4.14
0147									
1	(2pct_Milk, Bananas)	(White_Bread)	0.031618	0.119118	...	0.813953	6.833190	0.021969	4.73
4743									
2	(Bananas, White_Bread)	(2pct_Milk)	0.032353	0.109559	...	0.795455	7.260525	0.022191	4.35
3268									
3	(Wheat_Bread, Cola)	(2pct_Milk)	0.032353	0.109559	...	0.795455	7.260525	0.022191	4.35
3268									
4	(Popcorn_Salt, 2pct_Milk)	(Eggs)	0.033088	0.122794	...	0.822222	6.695941	0.023143	4.93
4283									

[5 rows x 9 columns]



	antecedents	consequents	antecedent support	...	lift	leverage	conviction
2	(Bananas, White_Bread)	(2pct_Milk)	0.032353	...	7.260525	0.022191	4.353268
3	(Wheat_Bread, Cola)	(2pct_Milk)	0.032353	...	7.260525	0.022191	4.353268
8	(Wheat_Bread, Onions)	(2pct_Milk)	0.034559	...	7.573897	0.024890	5.231342
10	(Wheat_Bread, Potatoes)	(2pct_Milk)	0.032353	...	7.053081	0.021455	3.917941
13	(Wheat_Bread, Toothpaste)	(2pct_Milk)	0.034559	...	7.379694	0.024155	4.650082
16	(Hamburger_Buns, White_Bread)	(98pct_Fat_Free_Hamburger)	0.034559	...	8.202379	0.023243	3.873730
17	(Wheat_Bread, 98pct_Fat_Free_Hamburger)	(White_Bread)	0.029412	...	7.555556	0.022967	8.808824
29	(Hot_Dog_Buns, Sweet_Relish)	(Hot_Dogs)	0.036029	...	9.031422	0.026809	5.557537
35	(Toilet_Paper, Potatoes)	(White_Bread)	0.028676	...	7.318772	0.021584	6.870882
37	(Toothpaste, Toilet_Paper)	(White_Bread)	0.029412	...	7.345679	0.022232	7.047059
42	(Potato_Chips, Eggs, White_Bread)	(2pct_Milk)	0.033824	...	7.143274	0.022765	4.096029
45	(White_Bread, Eggs, Toothpaste)	(2pct_Milk)	0.032353	...	7.260525	0.022191	4.353268
46	(Potato_Chips, 2pct_Milk, Toothpaste)	(White_Bread)	0.028676	...	7.318772	0.021584	6.870882
47	(Potato_Chips, 2pct_Milk, White_Bread)	(Toothpaste)	0.033088	...	9.514403	0.022372	3.766043
48	(Potato_Chips, White_Bread, Toothpaste)	(2pct_Milk)	0.030147	...	7.569160	0.021697	5.215441
49	(2pct_Milk, White_Bread, Toothpaste)	(Potato_Chips)	0.033088	...	7.725982	0.021764	3.690842

[16 rows x 9 columns]

	antecedents	consequents	antecedent support	...	lift	leverage	conviction
0	(2pct_Milk, Aspirin)	(White_Bread)	0.034559	...	6.608878	0.023089	4.140147
1	(2pct_Milk, Bananas)	(White_Bread)	0.031618	...	6.833190	0.021969	4.734743
2	(Bananas, White_Bread)	(2pct_Milk)	0.032353	...	7.260525	0.022191	4.353268
3	(Wheat_Bread, Cola)	(2pct_Milk)	0.032353	...	7.260525	0.022191	4.353268
4	(Popcorn_Salt, 2pct_Milk)	(Eggs)	0.033088	...	6.695941	0.023143	4.934283
5	(Potato_Chips, 2pct_Milk)	(Eggs)	0.044853	...	6.141160	0.028316	3.567304
6	(Tomatoes, 2pct_Milk)	(Eggs)	0.032353	...	6.477953	0.021763	4.288562
7	(Wheat_Bread, Eggs)	(2pct_Milk)	0.040441	...	6.970104	0.026452	3.767251
8	(Wheat_Bread, Onions)	(2pct_Milk)	0.034559	...	7.573897	0.024890	5.231342
9	(Potato_Chips, Toothpaste)	(2pct_Milk)	0.037500	...	6.979866	0.024568	3.784375
10	(Wheat_Bread, Potatoes)	(2pct_Milk)	0.032353	...	7.053081	0.021455	3.917941
11	(2pct_Milk, Potatoes)	(White_Bread)	0.038235	...	6.457740	0.024857	3.817157
12	(Tomatoes, 2pct_Milk)	(White_Bread)	0.032353	...	6.677890	0.021881	4.306536
13	(Wheat_Bread, Toothpaste)	(2pct_Milk)	0.034559	...	7.379694	0.024155	4.650082
14	(2pct_Milk, Toothpaste)	(White_Bread)	0.043382	...	6.403013	0.027921	3.712290
15	(98pct_Fat_Free_Hamburger, Potatoes)	(Eggs)	0.032353	...	6.292869	0.021027	3.859706
16	(Hamburger_Buns, White_Bread)	(98pct_Fat_Free_Hamburger)	0.034559	...	8.202379	0.023243	3.873730
17	(Wheat_Bread, 98pct_Fat_Free_Hamburger)	(White_Bread)	0.029412	...	7.555556	0.022967	8.808824
18	(Aspirin, Eggs)	(White_Bread)	0.038235	...	6.457740	0.024857	3.817157
19	(Potato_Chips, Aspirin)	(White_Bread)	0.036029	...	6.339128	0.022914	3.596936
20	(Aspirin, Potatoes)	(White_Bread)	0.030147	...	6.961759	0.021409	5.159454
21	(Aspirin, Toothpaste)	(White_Bread)	0.030882	...	6.995885	0.022057	5.285294
22	(Wheat_Bread, Cola)	(White_Bread)	0.032353	...	6.487093	0.021146	3.875882
23	(Hot_Dogs, Potatoes)	(Eggs)	0.032353	...	6.292869	0.021027	3.859706
24	(Pepperoni_Pizza_-_Frozen, White_Bread)	(Eggs)	0.033824	...	6.196303	0.021582	3.668316
25	(Popcorn_Salt, Potatoes)	(Eggs)	0.030882	...	6.592529	0.021208	4.605331
26	(Popcorn_Salt, White_Bread)	(Eggs)	0.035294	...	6.277445	0.022872	3.827807
27	(Sweet_Relish, Potatoes)	(Eggs)	0.036029	...	6.481730	0.024252	4.298309
28	(Sugar_Cookies, White_Bread)	(Eggs)	0.035294	...	6.277445	0.022872	3.827807
29	(Hot_Dog_Buns, Sweet_Relish)	(Hot_Dogs)	0.036029	...	9.031422	0.026809	5.557537
30	(Potato_Chips, Onions)	(White_Bread)	0.036029	...	6.339128	0.022914	3.596936
31	(Onions, Toothpaste)	(White_Bread)	0.035294	...	6.471193	0.023002	3.843850
32	(Tomatoes, Potato_Chips)	(White_Bread)	0.032353	...	6.677890	0.021881	4.306536
33	(Potato_Chips, Toothpaste)	(White_Bread)	0.037500	...	6.748971	0.025680	4.492500
34	(Wheat_Bread, Potato_Chips)	(White_Bread)	0.033824	...	6.752550	0.023177	4.502288
35	(Toilet_Paper, Potatoes)	(White_Bread)	0.028676	...	7.318772	0.021584	6.870882

	antecedents	consequents	antecedent support	...	lift	leverage	conviction
0	(2pct_Milk, Aspirin)	(White_Bread)	0.034559	...	6.608878	0.023089	4.140147
1	(2pct_Milk, Bananas)	(White_Bread)	0.031618	...	6.833190	0.021969	4.734743
2	(Bananas, White_Bread)	(2pct_Milk)	0.032353	...	7.260525	0.022191	4.353268
3	(Wheat_Bread, Cola)	(2pct_Milk)	0.032353	...	7.260525	0.022191	4.353268
4	(Popcorn_Salt, 2pct_Milk)	(Eggs)	0.033088	...	6.695941	0.023143	4.934283
5	(Potato_Chips, 2pct_Milk)	(Eggs)	0.044853	...	6.141160	0.028316	3.567304
6	(Tomatoes, 2pct_Milk)	(Eggs)	0.032353	...	6.477953	0.021763	4.288562
7	(Wheat_Bread, Eggs)	(2pct_Milk)	0.040441	...	6.970104	0.026452	3.767251
8	(Wheat_Bread, Onions)	(2pct_Milk)	0.034559	...	7.573897	0.024890	5.231342
9	(Potato_Chips, Toothpaste)	(2pct_Milk)	0.037500	...	6.979866	0.024568	3.784375
10	(Wheat_Bread, Potatoes)	(2pct_Milk)	0.032353	...	7.053081	0.021455	3.917941
11	(2pct_Milk, Potatoes)	(White_Bread)	0.038235	...	6.457740	0.024857	3.817157
12	(Tomatoes, 2pct_Milk)	(White_Bread)	0.032353	...	6.677890	0.021881	4.306536
13	(Wheat_Bread, Toothpaste)	(2pct_Milk)	0.034559	...	7.379694	0.024155	4.650082
14	(2pct_Milk, Toothpaste)	(White_Bread)	0.043382	...	6.403013	0.027921	3.712290
15	(98pct_Fat_Free_Hamburger, Potatoes)	(Eggs)	0.032353	...	6.292869	0.021027	3.859706
16	(Hamburger_Buns, White_Bread)	(98pct_Fat_Free_Hamburger)	0.034559	...	8.202379	0.023243	3.873730
17	(Wheat_Bread, 98pct_Fat_Free_Hamburger)	(White_Bread)	0.029412	...	7.555556	0.022967	8.808824
18	(Aspirin, Eggs)	(White_Bread)	0.038235	...	6.457740	0.024857	3.817157
19	(Potato_Chips, Aspirin)	(White_Bread)	0.036029	...	6.339128	0.022914	3.596936
20	(Aspirin, Potatoes)	(White_Bread)	0.030147	...	6.961759	0.021409	5.159454
21	(Aspirin, Toothpaste)	(White_Bread)	0.030882	...	6.995885	0.022057	5.285294
22	(Wheat_Bread, Cola)	(White_Bread)	0.032353	...	6.487093	0.021146	3.875882
23	(Hot_Dogs, Potatoes)	(Eggs)	0.032353	...	6.292869	0.021027	3.859706
24	(Pepperoni_Pizza_-_Frozen, White_Bread)	(Eggs)	0.033824	...	6.196303	0.021582	3.668316
25	(Popcorn_Salt, Potatoes)	(Eggs)	0.030882	...	6.592529	0.021208	4.605331
26	(Popcorn_Salt, White_Bread)	(Eggs)	0.035294	...	6.277445	0.022872	3.827807
27	(Sweet_Relish, Potatoes)	(Eggs)	0.036029	...	6.481730	0.024252	4.298309
28	(Sugar_Cookies, White_Bread)	(Eggs)	0.035294	...	6.277445	0.022872	3.827807
29	(Hot_Dog_Buns, Sweet_Relish)	(Hot_Dogs)	0.036029	...	9.031422	0.026809	5.557537
30	(Potato_Chips, Onions)	(White_Bread)	0.036029	...	6.339128	0.022914	3.596936
31	(Onions, Toothpaste)	(White_Bread)	0.035294	...	6.471193	0.023002	3.843850
32	(Tomatoes, Potato_Chips)	(White_Bread)	0.032353	...	6.677890	0.021881	4.306536
33	(Potato_Chips, Toothpaste)	(White_Bread)	0.037500	...	6.748971	0.025680	4.492500
34	(Wheat_Bread, Potato_Chips)	(White_Bread)	0.033824	...	6.752550	0.023177	4.502288
35	(Toilet_Paper, Potatoes)	(White_Bread)	0.028676	...	7.318772	0.021584	6.870882

35	(Toilet_Paper, Potatoes)	(White_Bread)	0.028676	...	7.318772	0.021584	6.870882
36	(Toothpaste, Potatoes)	(White_Bread)	0.032353	...	6.677890	0.021881	4.306536
37	(Toothpaste, Toilet_Paper)	(White_Bread)	0.029412	...	7.345679	0.022232	7.047059
38	(Tomatoes, Toothpaste)	(White_Bread)	0.030882	...	6.995885	0.022057	5.285294
39	(Wheat_Bread, Toothpaste)	(White_Bread)	0.034559	...	6.430260	0.022354	3.763770
40	(Potato_Chips, 2pct_Milk, Eggs)	(White_Bread)	0.033824	...	6.570048	0.022442	4.052059
41	(Potato_Chips, 2pct_Milk, White_Bread)	(Eggs)	0.033088	...	6.514970	0.022408	4.386029
42	(Potato_Chips, Eggs, White_Bread)	(2pct_Milk)	0.033824	...	7.143274	0.022765	4.096029
43	(2pct_Milk, Eggs, Toothpaste)	(White_Bread)	0.030882	...	6.995885	0.022057	5.285294
44	(2pct_Milk, White_Bread, Toothpaste)	(Eggs)	0.033088	...	6.333999	0.021672	3.947426
45	(White_Bread, Eggs, Toothpaste)	(2pct_Milk)	0.032353	...	7.260525	0.022191	4.353268
46	(Potato_Chips, 2pct_Milk, Toothpaste)	(White_Bread)	0.028676	...	7.318772	0.021584	6.870882
47	(Potato_Chips, 2pct_Milk, White_Bread)	(Toothpaste)	0.033088	...	9.514403	0.022372	3.766043
48	(Potato_Chips, White_Bread, Toothpaste)	(2pct_Milk)	0.030147	...	7.569160	0.021697	5.215441
49	(2pct_Milk, White_Bread, Toothpaste)	(Potato_Chips)	0.033088	...	7.725982	0.021764	3.690842

[50 rows x 9 columns]

## Les captures du code :

```
tp1.py  X
tp1.py > ...
1  import numpy as np
2  import pandas as pd
3  import itertools
4
5  #lecture de dataframe
6  data = pd.read_table('market_basket.txt')
7
8  #affichier 10 premiers ligne
9  print(data.head(10))
10 print(data.iloc[1:11])
11
12 #taille de dataframe
13 print(data.shape)
14
15 # Question 4
16 col=data['Product'].sort_values().unique()
17 lig=data['ID'].unique()
18
19 matrix=np.zeros((len(lig),len(col)))
20 k=0
21 for i in lig:
22     df=data[data["ID"]==i]
23     a=0
24     for j in col:
25         if df['Product'].str.contains(j).any():
26             matrix[k][a]=1
27             a=a+1
28     k=k+1
29
30 df = pd.DataFrame(matrix, index=lig,columns=col)
31 print(df)
32
```

tp1.py X

tp1.py > ...

```
33
34 # Question 5
35 df=pd.crosstab(data['ID'],data['Product'])
36 print(df)
37
38 # Question 6
39 df.iloc[:3,:30]
40
41 # Question 7
42
43 nbr_max_produit=2 #nbr max doit etre 4 mais ça sature la mémoire
44 def ExtractItemset(df, n):
45     return list(itertools.combinations(df, n))
46
47 def CalculSupport (df,subsets,n):
48     tab=[]
49     k=0
50     for i in subsets:
51         subset=df[list(i)]
52         w=subset[subset.sum(axis='columns')==n].count()
53         tab.append(w[0])
54         k=k+1
55     return(tab)
56
```

```

tp1.py  X
tp1.py > ...
57 # le main du programme
58 min_supp=0.025*len(lig)
59 for i in range(1,nbr_max_produit+1):
60     itemset=ExtractItemset(col,i)
61     Support=CalculSupport(df,itemset,i)
62     ff= pd.DataFrame(itemset)
63     sup=pd.DataFrame(Support)
64     sup.columns=['Support']# Renommer la colonne sup
65     frame=[ff,sup]
66     F=pd.concat(frame,axis=1)
67     C=F[F["Support"]>min_supp] #filtrer avec la contition min_sup
68     print("C",i)
69     print(C)
70
71 def Regle(item):
72     it=item[:-1]
73     for i in range(1,nbr_max_produit):
74         List=ExtractItemset(it,i)
75         PremisList=List[:-i]
76         Ccllist=List[i:]
77         PremisSupport=CalculSupport(df,PremisList,i)
78         TotalSupport=CalculSupport(df,[it],nbr_max_produit)
79     return(PremisList,Ccllist,np.array(TotalSupport)/np.array(PremisSupport))
80
81

```

```

83 AprioriRes=[]
84 k=0
85 for i in C.index:
86     k=k+1
87     ligne=list(C.loc[i,:])
88     Premis,Ccl,Confidence=Regle(ligne)
89     print('Regle :',Premis,' -> ',Ccl,' With confidence',Confidence)
90
91
92     from mlxtend.frequent_patterns import apriori, association_rules
93     frq_items = apriori(df, min_support = 0.025, use_colnames = True)
94     rules = association_rules(frq_items, metric ="lift", min_threshold = 1)
95     rules = rules.sort_values(['confidence', 'lift'], ascending =[False, False])
96     print(rules.head())
97
98 # Question 8
99 print(rules[:15])
100

```



```

102 # Question 9
103 def is_inclus(_subset,_set):
104     if len(_subset)>len(_set):
105         return(False)
106     for i in _subset:
107         if not(i in _set):
108             return(False)
109     return(True)
110 print(is_inclus(['balkiss','mahfoudh'],['balkiss','mahfoudh','3IDL02']))
111
112
113 # Question 10
114 Rules_itemset=[list(a)+list(c) for a,c in zip(rules['antecedents'],rules['consequents'])]
115 for i in Rules_itemset:
116     if is_inclus(['Aspirin'],i):
117         print(i)
118
119
120 #Question 11
121 for i in Rules_itemset:
122     if is_inclus(['Aspirin','Eggs'],i):
123         print(i)

```

```

120 #Question 11
121 for i in Rules_itemset:
122     if is_inclus(['Aspirin','Eggs'],i):
123         print(i)
124
125
126 #Question 12
127 rules = association_rules(frq_items, metric ="confidence", min_threshold = 0.75)
128
129 # Question 13
130 print(rules[:5])
131
132 # Question 14
133 print(rules[rules.lift>7])
134
135 # Question15
136 print(rules[rules.consequents.str.contains('2pct_Milk', na=True)] )
137

```