

Spyder (Python 3.11)

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C:\Users\Dave\OneDrive\Documents\Python Scripts\Activity 3 pt. 1.py

```
1 # calculate the probability of cancer
2
3 # calculate P(A|B) given P(A), P(B|A)
4 def bayes_theorem(p_a, p_b_given_a, p_b_given_not_a, prior_probs):
5     # calculate P(not A)
6     not_a = 1 - p_a
7     # calculate P(B)
8     p_b = p_b_given_a * p_a + p_b_given_not_a * not_a
9     # calculate P(A|B)
10    p_a_given_b = (p_b_given_a * p_a) / p_b
11    return p_a_given_b
12
13 # P(A)
14 p_a = 0.0002
15 # P(B|A)
16 p_b_given_a = 0.85
17 # P(B|not A)
18 p_b_given_not_a = 0.05
19 # calculate P(B)
20 result = bayes_theorem(p_a, p_b_given_a, p_b_given_not_a, prior_probs)
21 # summarize
22 print('P(A|B) = %.3f%%' % (result * 100))
```

Name	Type	Size	Value
i	int	1	1
j	int	1	1
p_a	float	1	0.0002
p_b_given_a	float	1	0.85
p_b_given_not_a	float	1	0.05
prior_probs	Array of float64	(2, 2)	[[0.33 0.3] [0.2 0.17]]
result	float	1	0.0033891547049461782

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Console 1/A X

Python 3.11.5 | packaged by Anaconda, Inc. | (main, Sep 11 2023, 13:26:23) [MSC v.1916 64 bit (AMD64)]
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IPython 8.15.0 -- An enhanced Interactive Python.

```
In [1]: runfile('C:/Users/Dave/OneDrive/Documents/Python Scripts/Activity 3 pt. 1.py', wdir='C:/Users/Dave/OneDrive/Documents/Python Scripts')
P(A|B) = 0.339%
```

```
In [2]: runfile('C:/Users/Dave/OneDrive/Documents/Python Scripts/Activity 3.py', wdir='C:/Users/Dave/OneDrive/Documents/Python Scripts')
```

Important

Figures are displayed in the Plots pane by default. To make them also appear inline in the console, you need to uncheck "Hide inline plotting" under the options menu of Plots.

```
In [3]:
```

Python Console History

conda (Python 3.11.5) Completions: conda LSP: Python Line 1, Col 1 ASCII CRLF RW Mem 83%

Spyder (Python 3.11)

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C:\Users\Dave\.spyder-py3\untitled0.py

```
1 # -*- coding: utf-8 -*-
2 """
3 Created on Sat Feb 17 13:40:07 2024
4
5 @author: Dave
6 """
7 import numpy as np
8 import matplotlib.pyplot as plt
9
10 prior_probs = np.array([[0.33, 0.3], [0.2, 0.17]])
11
12 plt.imshow(prior_probs, cmap='gray')
13 plt.colorbar()
14
15 for i in range(2):
16     for j in range(2):
17         plt.annotate(prior_probs[i,j], (j,i), color="red", fontsize=20, fontweight='bold', ha='center', va='center')
18
19 plt.title('Prior Probabilities', fontsize=20)
```

141 %

Prior Probabilities

	0.0	0.5
0.0	0.33	0.3
0.5	0.2	0.17

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Console I/O X

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IPython 8.15.0 -- An enhanced Interactive Python.

In [1]: runfile('C:/Users/Dave/.spyder-py3/temp.py', wdir='C:/Users/Dave/.spyder-py3')

P(A|B) = 0.333%

In [2]: runfile('C:/Users/Dave/.spyder-py3/untitled0.py', wdir='C:/Users/Dave/.spyder-py3')

Important

Figures are displayed in the Plots pane by default. To make them also appear inline in the console, you need to uncheck "Mute inline plotting" under the options menu of Plots.

In [3]:

Python Console History

conda (Python 3.11.5) Completions: conda LSP: Python Line 19, Col 46 UTF-8 CRLF RW Mem 64%