Credentials

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Code to calculate the Bayes Theorem

```
In [1]: def bayesTheorem(ba,a,b):
    res=(ba*a)/b
    print("The Posterior Probability [ P(A|B) ] is : ",res)

# Input

ba=float(input("Enter the value of P(B|A) : "))
a=float(input("Enter the value of P(A) : "))
b=float(input("Enter the value of P(B) : "))

bayesTheorem(ba,a,b)

Enter the value of P(B|A) : 0.07
Enter the value of P(B) : 0.10
Enter the value of P(B) : 0.05
The Posterior Probability [ P(A|B) ] is : 0.14
```

Code to calculate Eigen Value and Eigen Vector of a Matrix

```
import numpy as np
In [2]:
In [3]: # 3 x 3 Matrix
        matrix=[[1,2,3],[4,5,6],[7,8,9]]
        array=np.array(matrix)
        x,y=np.linalg.eig(array)
In [4]: # to print eigen values
        print("Eigen Values of the given Matrix is :\n",x)
       Eigen Values of the given Matrix is :
        [ 1.61168440e+01 -1.11684397e+00 -1.30367773e-15]
In [5]: # to print eigen vectors
        print("Eigen Vectors of the given Matrix is :\n",y)
        Eigen Vectors of the given Matrix is :
        [[-0.23197069 -0.78583024 0.40824829]
        [-0.52532209 -0.08675134 -0.81649658]
```

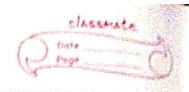
Code to calculate Determinant of a Matrix

Code to calculate the Inverse of a Matrix

-0.33333333 0.083333333]]

[0.75

Assignment (Week 4)



1. Could 19 tests are commun usualays, but some results of tests are not true. Let's assume, a diagonatic test has 98% accuracy and 60% of all people have Covid 19. If a patient tests positive, what is the probability that they achieve the disease p

Let P(A): Probability that a person has covid 19
P(B): Probability that a person do not have covid 19
P(T|A): Probability of testing positive given that person
has covid 19

P(T/B): Brobability of testing given that person do not have covid 19

P(A|T): Probability that a person has covid 19 given that they tested positive. (we need to find this)

Given

$$P(A) = 0.60$$
 $P(T|A) = 0.99$
 $P(T|B) = 0.01$
 $P(B) = 1 - p(A) = 1 - 0.60$
 $= 0.40$

Using Bayes' Theorem:

$$P(A|T) = P(T|A) . P(A)$$

$$P(T)$$

NOW

$$P(T) = P(T|A)P(A) + P(T|B).P(B)$$

$$P(T) = (0.99 \times 0.60) + (0.01 \times 0.40)$$

$$P(T) = 0.599 + 0.009$$

$$P(T) = 0.598$$

1 a distall

$$P(T) = 0.598$$

$$P(A|T) = P(T|A) \cdot P(A)$$

$$P(T) = P(T)$$

$$(0.99) (0.60) = 0.594$$

$$0.558$$

$$0.558$$

Find the eigen value and eigen vector for the given matrix 2.

given
$$A = \begin{bmatrix} 2 & 2 & 3 \end{bmatrix}$$

$$AX = \lambda I$$

$$A - \lambda I = 0$$

$$\Rightarrow$$
 $\lambda^2 - 5\lambda + 4 = 0$

Now, for 1=4

$$\Rightarrow \begin{bmatrix} -2 & 2 & 1 \\ 1 & -1 & y \end{bmatrix}$$

$$\frac{1}{2} - 2x + 2y = 0$$

$$\frac{1}{2}x - \frac{1}{2}y$$

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$$\Rightarrow |x + 2y = 0$$

$$\Rightarrow |x = -2y$$

Calculate, a 3x3 matrix and find the inverse

of the matrix

· 3.

$$A =
 \begin{bmatrix}
 1 & 2 & 3 \\
 4 & 5 & 6 \\
 7 & 2 & 9
 \end{bmatrix}$$

$$\frac{1}{2} \left(\frac{45 - 12}{12} \right) - 2\left(\frac{36 - 42}{12} \right) + \left| \frac{3}{8} \left(\frac{8 - 35}{12} \right) \right|$$

$$\frac{1}{2} \left(\frac{33 + 12}{12} \right) + \left(\frac{24 - 105}{12} \right)$$

As the chaleminant exist, so they will he inverse existing.

now, its first the inverse of the 3x3

lets find the minors of the above maloix:

$$M_{11} = \begin{vmatrix} 5 & 2 \\ 6 & 9 \end{vmatrix} = 45 - 12 = 33$$

$$M_{12} = \begin{vmatrix} 4 & 6 \end{vmatrix} = 36 - 42 = -6$$

$$M_{13} = |45| = 8-35 = -27$$

$$M_{21} = \begin{vmatrix} 2 & 3 \\ 2 & 9 \end{vmatrix} = 18 - 6 = 12$$

$$M_{22} = \begin{vmatrix} 1 & 3 \end{vmatrix} = 9 - 21 = -12$$

$$M_{23} = |12| = 2 - 14 = -12$$

$$M_{31} = 23 = 12-15 = -3$$

$$M_{31} = 13 = 6 - 12 = -6$$

$$M_{33} = 12 = 5-8 = -3$$

Now	the positions are =	/+ - +
35.	Commence of the second	1 1 1 1 1 1 1
A MILL STORY	to the second se	1 + - +

Similarly, the cofactors are =
$$\begin{bmatrix} 33 & 6 & -27 \\ -12 & -12 & 12 \end{bmatrix}$$

 $\begin{bmatrix} -3 & 6 & -3 \end{bmatrix}$

Adjoint A = (wfactor)

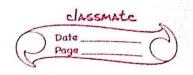
Now,

$$A^{-1} = 1$$
 Adj $A = 1$ $\begin{vmatrix} 33 & -12 & -3 \\ 6 & -12 & 6 \\ -27 & 12 & -3 \end{vmatrix}$

$$=) \frac{-11}{12} \frac{1}{3} \frac{1}{12}$$

$$-\frac{1}{6} \frac{1}{3} \frac{-\frac{1}{6}}{12}$$

$$\frac{3}{4} \frac{-\frac{1}{3}}{12} \frac{\frac{1}{12}}{12}$$



4	. Describe the properties and applications of the
	Normal Distribution and calculate probabilities
	using its properties.
=>	The second of th
***************************************	Properties of Normal Distribution.
, 2	
(1)	The mean median and mode are all equal and
13/3	located at the center of the distribution.
(1)	The wormal distribution is symmetric about its
	mean. This means the left and the right halves of
, wis	the distribution are mixx or images.
(11)	The graph is bell shaped with the highest point
5	at that mean.
(10)	The shape and location of the womal distribution
	are determined by its mean and standard
	derichen.
<u> </u>	
	Applications of Normal Distribution: -
(ĭ).	It is used to analyze data and interpret pysoological
	tests and medical negation.
(II) .	It is applied in finance to model asset returns and
	proce hovements.
<u>(iti).</u>	Itsed in quality without processes to desect variations
	and improve manifacturing.
นั้งว	oud improve manifacturing. Ot is used in various strutstical methods
	like hypothesis testing and writtence intervals.
	J 100 11000005.

8. Suppose the height of adult men are womally distributed with mean of to inches and a standard denation of 8 Proper Find the propability that the randomly selected man is Julier Then ty Inches.

P(Z) from 2 table 1's 0.9082

P(x > 14) = 1 - P(2 < 1.33) 1-0.9082

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- 10. USI18 So, the probability that a randomly selected wan is taken than Ty inches is 9.18%. The Address of the Ad