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Subject : Data Science

Assignment 1

Title: Write a Python script for Bayes' Theorem.

```
def bayes_theorem(prior_A, likelihood_B_given_A, marginal_B):    if marginal_B == 0:
        raise ValueError("Marginal probability P(B) cannot be zero.")


    posterior_A_given_B = (likelihood_B_given_A * prior_A) / marginal_B
    return posterior_A_given_B


def main():
    print("Bayes' Theorem Calculator")


    try:
        # Input prior probability P(A)
        prior_A = float(input("Enter the prior probability P(A): "))
        # Input likelihood P(B | A)
        likelihood_B_given_A = float(input("Enter the likelihood P(B | A): "))
        # Input marginal probability P(B)
        marginal_B = float(input("Enter the marginal probability P(B): "))


        # Calculate the posterior probability P(A | B)
        posterior_A_given_B = bayes_theorem(prior_A, likelihood_B_given_A, marginal_B)
```

```
        # Display the result
        print(f"The posterior probability P(A | B) is: {posterior_A_given_B:.4f}")

    except ValueError as e:
        print(f"Invalid input: {e}")

if __name__ == "__main__":
    main()
```

```
PS C:\Users\hp\Desktop\Sk> py Assignment1.py
Bayes' Theorem Calculator
Enter the prior probability P(A): 0.8
Enter the likelihood P(B | A): 3.5
Enter the marginal probability P(B): .9
The posterior probability P(A | B) is: 3.1111
PS C:\Users\hp\Desktop\Sk>
```