

MannanNaeem_HW4

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```
[2]: #Two group prevalence
under_50 = 0.02
over_50 = 0.08

#Accuracy levels
acc_under_50 = 0.95
acc_over_50 = 0.90

#Error rate, false positive
err_rate = 0.05

def bayesian_update_disease(prior, accuracy, false_positive_rate):

    # Numerator: true positives
    numerator = accuracy * prior

    # Denominator: total probability of a positive test
    denominator = (accuracy * prior) + (false_positive_rate * (1 - prior))

    # Bayes rule
    posterior = numerator / denominator
    return posterior
```

```
[9]: print("Under 50 group probability: ", f"{bayesian_update_disease(under_50, acc_under_50, err_rate)*100:.3f}%")
      print("Over 50 group probability: ", f"{bayesian_update_disease(over_50, acc_over_50, err_rate)*100:.3f}%")
```

Under 50 group probability: 27.941%
Over 50 group probability: 61.017%

```
[10]: model_1 = 0.70
      error   = 0.30
      actual  = 0.20

def bayesian_update_weather(prior, likelihood, false_positive_rate):

    # Numerator: true positives
```

```
numerator = likelihood * prior

# Denominator: total probability of a positive test
denominator = (likelihood * prior) + (false_positive_rate * (1 - prior))

# Bayes rule
posterior = numerator / denominator
return posterior
```

```
[11]: print("Probability of it raining: ", f"{bayesian_update_disease(model_1, ↵
↵actual, error)*100:.3f}%")
```

Probability of it raining: 60.870%