# STA 3180 Statistical Modelling: Bayesian Inference

I. Introduction to Bayesian Inference

A. Definition of Bayesian Inference

B. Advantages and Disadvantages of Bayesian Inference

C. Examples of Bayesian Inference

II. Bayesian Estimation

A. Maximum A Posteriori Estimation

1. Definition

2. Properties

3. Strategies for Problem Solving

a. Identify the prior distribution

b. Calculate the posterior distribution

c. Use the posterior distribution to make predictions

B. Maximum Likelihood Estimation

1. Definition

2. Properties

3. Strategies for Problem Solving

a. Identify the likelihood function

b. Calculate the maximum likelihood estimate

c. Use the maximum likelihood estimate to make predictions

III. Bayesian Model Selection

A. Bayes Factor

1. Definition

2. Properties

3. Strategies for Problem Solving

a. Identify the models to compare

b. Calculate the Bayes factor

c. Use the Bayes factor to make decisions

IV. Bayesian Hypothesis Testing

A. Bayesian Significance Testing

1. Definition

2. Properties

3. Strategies for Problem Solving

a. Identify the null and alternative hypotheses

b. Calculate the posterior probability of the null hypothesis

c. Use the posterior probability to make decisions

V. Conclusion

A. Summary of Bayesian Inference

B. Applications of Bayesian Inference