

Previously on MA40189:

- Bayes' theorem for random variables X and Y

$$\begin{aligned} f(y | x) &= \frac{f(x | y)f(y)}{f(x)} \\ &= \frac{f(x | y)f(y)}{\int_Y f(x | y)f(y) dy} \end{aligned}$$

- Bayes' theorem for parametric inference

$$f(\theta | x) \propto f(x | \theta)f(\theta)$$

- Posterior \propto Prior \times Likelihood

Today on MA40189:

- principle steps of the Bayesian method
- sequential data updates:

$$f(\theta | x, y) \propto f(y | x, \theta)f(\theta | x)$$

- update first by x and then by y
- $f(\theta | x)$ assumes the role of the prior (given x)
- $f(y | x, \theta)$ the likelihood (given x)
- if X and Y are conditionally independent given θ then

$$f(\theta | x, y) \propto f(y | \theta)f(x | \theta)f(\theta)$$

- conjugate Bayesian updates: prior and posterior from the same family
- Beta-Binomial example