1. Derivations and comparing posterior distributions (*Total credits: 20p*)
2. Logistic regression (*Total credits: 10p*)
3. decision on buying a financial option or not (*Total credits: 10p*)

$$x_i \sim Bern(\theta) \longrightarrow p(x_i|\theta) = \theta^{x_i}(1-\theta)^{1-x_i}$$

and

$$\theta \sim Beta(\alpha, \beta) \longrightarrow p(\theta) = \frac{\Gamma(\alpha+\beta)}{\Gamma(\alpha)\Gamma(\beta)}\theta^{\alpha-1}(1-\theta)^{\beta-1}$$