1. A spam filter is designed by looking at commonly occurring phrases in spam. Suppose that 80% of email is spam. In 10% of the spam emails, the phrase “free money” is used, whereas this phrase is only used in 1% of non-spam emails. A new email has just arrived, which does mention “free money”. What is the probability that it is spam?

P(A|B) = P(A∩B)/P(B)

P(Spam| Mention free money)

= P(Spam ∩ Mention free money) / P(Mention free money)

= 0.8\*0.1/ (0.2\*0.01 + 0.8\*0.1)

= 0.976