Quiz 4, February 1, 2012
Introduction to Probability - MATH/STATS 425, Winter 2012

Matt has three dice in his pocket, two usual fair dice and an unfair die with 6 dots on each side. He chooses one die at random and tosses; it shows 6 dots. What is the probability that it is the unfair die?

Consider the events

G = "the chosen die shows 6 dots",

F = "the chosen die is fair", U = "the chosen die is unfair"

By Bayes Formula,

$$P(U|G) = \frac{P(G|U)P(U)}{P(G|U)P(U) + P(G|F)P(F)} = \frac{1 \cdot \frac{1}{3}}{1 \cdot \frac{1}{3} + \frac{1}{6} \cdot \frac{2}{3}} = \frac{3}{4}.$$