5.

a. P (no A in English or no A in Chemistry) = P (no A in English) + P (no A in Chemistry) – P (no A in both English and Chemistry)

= 0.8 + 0.9 – 0.95

= 0.75

b. Events “Earning an A in Chemistry” and “Earning an A in English” are not disjoint, because P (A in English and A in Chemistry) = 0.05 ≠ 0

c. P (A in Chemistry | A in English) = 0.05 / 0.2 = 0.25 ≠ 0.1

P (A in English | A in Chemistry) = 0.05 / 0.1 = 0.5 ≠ 0.2

Therefore, “Earning an A in English”, and “Earning an A in Chemistry” are not independent events, because P (A) ≠ P (A | B).

6.

a. It’s a hypergeometric probability distribution.

b. X ~ Hypergeometric (200, 50, 1100)

P (X = 25) = 1.1999 × 10^-5 %

Here is the R code:

> hypergeometric <- function (x, n, N, M) {

+ return ((choose (M, x) \* choose (N - M, n - x) / choose (N, n)))

+ }

> hypergeometric (25, 200, 1100, 50)

[1] 1.199866e-07

7.

NV = a crime that is nonviolent

RNV = a crime that is reported given that it’s a nonviolent crime

RV = a crime that is reported given that it’s a violent crime

a. P (R) = P (NV) × P (RNV) + P (V) × P (RV)

= 0.62 × 0.83 + 0.17 × 0.83

= 0.7698416

b. P (NV | R) = P (R | NV) × P (NV) / P (R)

= 0.62 × 0.83 / 0.7698416

= 0.6684492