

## Recitation 19

### 1 Bayes' Rule

$$a. \frac{Pr(A \cap B)}{Pr\{B\}} = \frac{Pr(A \cap B)}{Pr\{A\}} \cdot Pr\{A\}$$

$$b. \frac{Pr\{R \cap U\}}{Pr\{U\}} = \frac{.8 \times .3}{.4} = .6$$

### 2 DNA Profiles

$$a. 1 - e^{-\frac{m^2}{2N}} = 1 - e^{-\frac{300m^2}{2 \cdot 206}} \approx 1$$

b. 2 arbitrary people matching is a certainty.  
Not a particular person matching.

### 3 The Immortals

a. McLeod is right. If  $p$  tends to tails.

$$b. nP(1-p)^{n-1}$$

$$c. \max_p \{ nP(1-p)^{n-1} \} \Rightarrow P = \frac{1}{n}$$

$$d. n \cdot \frac{1}{n} \left( \frac{n-1}{n} \right)^{n-1} = \left( \frac{n-1}{n} \right)^{n-1} = \left( 1 - \frac{1}{n} \right)^{n-1} \rightarrow 1/e$$