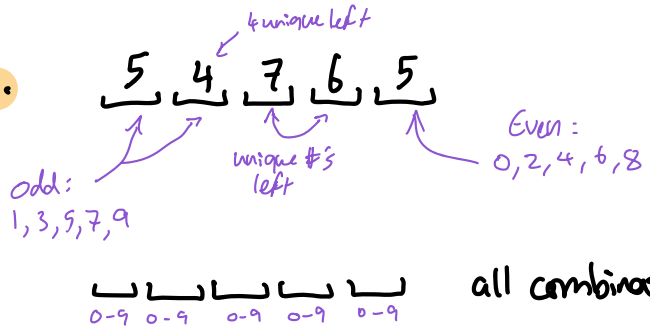
CSCI 104

HW

- HW5
- Problem 2

1. E = no student will have to answer more than 1 question

$$\left(\frac{15}{15}\right)\left(\frac{14}{15}\right)\left(\frac{13}{15}\right)\left(\frac{12}{15}\right)\left(\frac{11}{15}\right)\left(\frac{10}{15}\right)\left(\frac{9}{15}\right)\left(\frac{8}{15}\right) = 0.1012$$

2. 

$5 \cdot 4 \cdot 7 \cdot 6 \cdot 5 = 4200$

all combinations $10^5 \longrightarrow P = \frac{4200}{10^5} = \frac{21}{500}$

$\binom{n}{k} p^k q^{n-k} = \binom{n}{k} p^k (1-p)^{n-k}$ using Bernoulli: $\binom{8}{5}\left(\frac{21}{500}\right)^5 \left(1-\frac{21}{500}\right)^3 = 6.435 \times 10^{-6}$

3. A = at least two dice show 4 or above

B = all 3 dice show the same value

$P(E \cap F) = P(E) \cdot P(F)$

$P(E|F) = P(E)$

$P(A|B) = 1 \quad P(A) \neq 1$ so these events are not independent

$$P(A) = \underbrace{\left(\frac{3}{6}\right)\left(\frac{3}{6}\right)}_{2 \text{ dice}} + \underbrace{\left(\frac{3}{6}\right)\left(\frac{3}{6}\right)\left(\frac{3}{6}\right)}_{3 \text{ dice}} = \frac{3}{8}$$

$$P(B) = \left(\frac{1}{6}\right)^3 = \frac{1}{216}$$

$$P(A \cap B) = \frac{1}{216}$$

$P(A \cap B) \neq P(A) \cdot P(B)$

1. $p = \frac{4 \cdot \binom{13}{5}}{\binom{52}{5}}$ $\quad x$ = number of hands until flush

$E[X] = \frac{1}{p} = 504.8486$ hands

2.