1. $\binom{15}{8}$ pick 8 students to answer 1 question each.

$\overline{15^8}$

2. let p be the probality of a number meeting the criteria.

the number can only have at least 3 digits.

3 digit : $5 \times 5 \times 4 = 120$

4 digit : $5 \times 4 \times 5 \times 4 + 5 \times 5 \times 4 \times 3 = 700$

5 digit : $5 \times 4 \times 3 \times 5 \times 4 + 5 \times 4 \times 5 \times 4 \times 3$
$+ 5 \times 5 \times 4 \times 3 \times 2 + 5 \times 5 \times 4 \times 4 \times 3$
$= 1200 + 1200 + 600 + 1200$
$= 4200$

$P = \frac{120 + 700 + 4200}{100000}$

$= \frac{5020}{100000}$

$= 5.02\%$

answer = $(5.02\%)^5 \times (1 - 5.02\%)^3 \times \binom{8}{3}$

3. $P(A) = \frac{3 \times 3 \times 6 \times 3}{6 \times 6 \times 6} = \frac{1}{2}$

3. X = 4 or above (1 flip)
Y = 3 or below

XXX : 3×3×3
XXY : 3×3×3
XYX : 3×3×3
YXX : 3×3×3 +
108

$P(A) = \frac{108}{6^3} = \frac{1}{2}$

$P(A|B) = \frac{n(A \cap B)}{n(B)}$

$= \frac{3}{6}$

$= \frac{1}{2}$

$P(A) = P(A|B) \Rightarrow$ A and B independent

1. p: probability of getting a flush

$$P = \frac{\binom{13}{5}}{\binom{52}{5}} \times 4$$

$$= \frac{1287}{2598960} \times 4$$

$$= \frac{5148}{2598960} = \frac{33}{16660}$$

$$E(X) = \frac{1}{p}$$

$$= \frac{16660}{33} \approx 504.9$$

2. ~~A: superstar~~

~~B: win~~

2. A: the superstar plays all 5 games
B: the team wins 4/5

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

$$= \frac{P(B|A)\,P(A)}{P(B)}$$

$$\approx \frac{0.27 \times 0.75}{0.278}$$

$$\approx 0.73$$

$$P(A) = \frac{3}{4}$$

$$P(B) = \frac{3}{4} \times \left(\frac{7}{10}\right)^4 \times \left(\frac{3}{10}\right) \times 5 + \frac{1}{4} \times \left(\frac{1}{2}\right)^5$$

$$\approx 0.278$$