1.) 15 students

Professor asks 8 questions

8 students will be called meaning 7 won't be called (in scenario, there are not repeating students called, all new ones)

$\frac{7}{15} = 0.46$

$= 46\%$

2.) 00000 – 99999

even integers starting with 2 odd digits where all digits are unique

0 – 100 // Disregard because no even # with 2 odd digits

100 – 1000

3.) 3 six-sided, fair dice

A → event where at least 2 dice show 4 or above → 4, 5 or 6 → $\frac{3}{6}$ (3 outcomes)

B → event that all 3 dice show the same value

Are A and B independent?

P(A) = P(2) or more dice are 4, 5, or 6

$\frac{3}{6} \rightarrow \frac{6}{12} \rightarrow \frac{9}{18} = \frac{1}{2}$

$= \frac{1}{2}$

if two or rolls has > 4

9 → rolls are 4 and up

18 → all possibilities

P(B) all three times are the same

$= \frac{6}{6^3} = \frac{1}{36}$

$P(4) + P(5) + P(6) = \frac{1}{6^3} + \frac{1}{6^3} + \frac{1}{6^3} = \frac{3}{216} = \frac{1}{72}$

$P(A) * P(B) = \frac{1}{72}$

→ $P(4) + P(5) + P(6) = P(A) * P(B)$

Events A and B are independent

1.) $p = \frac{4 \cdot \binom{13}{5}}{\binom{52}{5}} = 4 \cdot \frac{\frac{13 \cdot 12 \cdot 11 \cdot 10 \cdot 9 \cdot 8 \cdot 7 \cdot 6 \cdot 5!}{5!}}{\frac{52 \cdots 8!}{5!}} = 0.00198$

$E[X] = \frac{1}{0.00198} \rightarrow 505$

Given → $P(\text{Superstar}) = 0.75$ for next 5 games

2) $P(\frac{\text{win}}{\text{superstar}}) = 0.7$ with star

$P(\frac{\text{win}}{\text{no superstar}}) = 0.5$ w/o star

$\frac{5!}{(1!)4!} = 5$

$= \frac{5!}{(1!)(4!)} \cdot 0.7^4 \cdot 0.3 = 0.36015$

$= \frac{5!}{(1!)(4!)} \cdot 0.5^5 = 0.15625$

$P(\text{win } 80\%) = (0.15625 \cdot 0.25) + (0.36015 \cdot 0.75) = 0.309175$

Bayes Theorm

$P\left(\frac{\text{Superstar plays}}{80\%}\right) = \frac{0.36015 \cdot 0.75}{0.309175} = 0.8737 = 87.37\%$