1) 15 students & questions $\binom{15}{8}$

1 question probability → $\binom{15\ 8-1}{15\ 7}$ → $\frac{\binom{15}{8}}{\binom{22}{14}}$ = Probability no student will have to answer more than one question

2) 5 digits → 10^5

$5 \times 5 \times 4 \times (7 \times 6)$ ← rest of combos $= \frac{4200}{10^5}$ ← amount of digits in next combo

5 → product even; 5 → sum of odd; 4 → prod of 2 repeated

$= 0.042$ chance

3) $P(A) = 3/6 \times 3/6 = 25\%$

$P(B) = \frac{6}{6} \times 1/6 \times 1/6 = 1/36$ either have same value

$P(A) \cdot P(B) = 0.25\left(\frac{36}{36}\right) \times 1/36 = \frac{9}{36} \times \frac{1}{36} = \frac{9}{1296} = \frac{3}{432}$

$P(A \cap B) = \frac{3}{216}$

no, they are not independent

4) $13/52 \binom{13}{5}$ The expected of getting a flush:

Getting a flush $= \frac{\binom{13}{5} \cdot 4}{\binom{52}{5}}$ ← from the 4 different suits of a card

Expected hands $\sum_{x=1}^{\infty} x\left(1 - \frac{\binom{13}{5} \cdot 4}{\binom{52}{5}}\right)^{x-1}\left(\frac{\binom{13}{5} \cdot 4}{\binom{52}{5}}\right) = \frac{1}{\frac{\binom{13}{5} \cdot 4}{\binom{52}{5}}}$

Chance not getting flush for $x-1$ hands

5) $P(S)$ → superstar plays game Team → T wins 4/5 games

$$P(S|T) = \frac{P(S \cap T)}{P(S)} = \frac{P(S|T) \cdot P(S)}{P(S)}$$

$$= \frac{\left(\binom{5}{4} \cdot 0.7^4 \cdot 0.3\right) \cdot 0.75}{\left(\binom{5}{4} \cdot 0.7^4 \cdot 0.3\right) + \left(\binom{5}{4} \cdot 0.5^4 \cdot 0.5\right)}$$