Probability Problems

1. Students A, B, C, ...

$P(A \text{ answers } 1^{st} Q) = \frac{1}{15}$ $P(A \to 1^{st} Q, B \to 2^{nd} Q \dots) = \left(\frac{1}{15}\right)^8$

Ways to choose 8 from 15 students (order matters) = $P(15, 8)$

$Ans = \left(\frac{1}{15}\right)^8 P(15, 8) = .1012 = 10.12\%$

2. even integers, 1st 2 digits=odd, all digits unique - - - - - -

$(5)(4)(8)(7)(6) = \#$ of integers that satisfy criteria

$P(\text{integer meets criteria}) = \frac{5 \cdot 4 \cdot 8 \cdot 7 \cdot 6}{10^5} = .0672$

exactly

$P(5 \text{ of } 8 \text{ integers meet criteria}) = (.0672)^5 (1 - .0672)^3 = 1.112 \times 10^{-6} \to$
$1.112 \times 10^{-4} \%$

3. $P(A) = \binom{3}{2}\left(\frac{3}{6}\right)^3 + \binom{3}{3}\left(\frac{3}{6}\right)^3 = \frac{4}{2^4} = \frac{3}{8}$

$P(B) = \left(\frac{1}{6}\right)^3 \cdot 6 = \frac{1}{6^2} = \frac{1}{36}$

Check if $P(A) \cdot P(B) = P(A \cap B)$

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

$P(A \cap B) = \left(\frac{1}{6}\right)^3 \cdot 3 = \frac{1}{72}$

Since $P(A) \cdot P(B) = P(A \cap B)$, A & B are independent

4. $\left(\frac{13}{52}\right)\left(\frac{12}{51}\right)\left(\frac{11}{50}\right)\left(\frac{10}{49}\right)\left(\frac{9}{48}\right) \cdot 4 \cdot P(4,4) = .04754$

$\frac{1}{.04754} = 21.019$

for 4 suits ↑   order doesn't matter ↑

5. Don't know