Probability

(1.) ask 8 questions to 15 students = 15^8
number of ways to select 8 students from 15
and arrange in order $P(15,8) = \frac{15!}{(15-8)!} = 259459200$

no student will have to answer more than One question $\frac{259459200}{15^8} \approx .1012$

(2.) 0-100 not possible to have an even number with 2 odd digits
100-1000: $= 5 \times 4 \times 5 = 100$
1000 - 10,000: $5 \times 4 \times 7 \times 5 = 700$
10,000 - 99,999: $5 \times 4 \times 7 \times 6 \times 5 = 4200$
$= 5000$

Total # of ints $= 10^5 \therefore \frac{5000}{10^5} = .05$

$_8C_5 (.05)^5 (1-.05)^3$

$= {_8C_5} (.05)^5 (.95)^3$

$= 1.5e04 \times 10^{-5}$

(3.) $n = 3$ dice $K = 2$ (that show 4) $\rightarrow$ Case 1: 2 #'s ≥ 4
$p = .5$ $q = 1 - .5 = .5$

$\binom{3}{2} \cdot .5^2 \cdot .5 = .375$

Case 2: 3 #'s ≥ 4 $\frac{3}{6} \cdot \frac{3}{6} \cdot \frac{3}{6} = \frac{1}{8} = .125$

Event B: $\frac{1}{6} \cdot \frac{1}{6} \cdot \frac{6}{6} = \frac{1}{36} = .027$

- $P(A \cap B)$ $3/216 = .0138$
- $P(A) \cdot P(B) = .027 + .5 = .527$

Values A and B are not independent

Prob Pt2.)

(4.) 1.) $P(5 \text{ cards, all same suit}) = \frac{{}_4C_1 \, {}_{13}C_5}{{}_{52}C_5}$

$= \frac{5148}{2598960} = .00196$

$(5)(.00196)$

$(3)(.00196) + (4)(.00196)$

$(1)(.00196) + (2)(.00196)$

$.0294$

$\therefore$ # of hands $= 34.01$

$\frac{1}{.0294}$

2.) no superstar $= .5$ $\rangle .25$

w/ superstar $= .7$ $\rangle .75$

$\frac{P(\text{win } 4/15 \mid \text{superstar}) \, P(\text{superstar})}{P(\text{win } 4/15)}$

$P(\text{win } 4/15) = P(\text{superstar}) \, P(\text{win } 4/15 \mid \text{superstar}) + P(\text{win } 4/15 \mid \text{no superstar}) \, P(\text{no superstar})$

$n = 5 \quad k = 4$

$p = .7 \quad q = .3$ $= \binom{5}{4}(.7)^4(.3)$

$P(\text{win } 4/5 \mid \text{superstar}) = .3602$

$n = 5 \quad k = 4$

$p = .5 \quad q = .5$ $= \binom{5}{4}(.5)^4(.5)$

$P(\text{win } 4/15 \mid \text{no superstar}) = .1563$

$\frac{(.75)(.3602)}{(.25)(.1563) + (.3602)(.75)}$

$P(\text{superstar} \mid \text{win } 4/15) = \underline{.8737}$