Probability Problems

(1) $\frac{15}{15} \times \frac{14}{15} \times \frac{13}{15} \times \frac{12}{15} \times \frac{11}{15} \times \frac{10}{15} \times \frac{9}{15} \times \frac{8}{15} = .101$ **10.1%**

(2) from 100 - 999 : $5 \cdot 5 \cdot 4 = 100$
from 1000 - 9999 : $5 \cdot 5 \cdot 7 \cdot 4 = 700$
from 10,000 - 99,999 : $5 \cdot 5 \cdot 6 \cdot 7 \cdot 4 = 4200$

$\frac{100 + 700 + 4200}{100,000} = .05$

$\frac{8!}{5!3!} \cdot (.05)^5 (1 - .05)^3 = \boxed{1.5 \times 10^{-5}}$

(3) A and B are not independent since B's event being true depends on A's value (4, 5, or 6).

(4) flush probability : $4X \frac{13!}{5!8!} \times \frac{52!}{6!47!} = .00198$
$E[X] = \frac{1}{p} = \frac{1}{.00198} = \boxed{505.05}$

(5) $P(\text{win} \mid \text{plays}) = .7$ $P(\text{wins} \mid \text{no play}) = .5$
$P(\text{plays}) = .75$

$P(\text{win } 4/5 \mid \text{plays}) = \frac{5!}{4!} \cdot .7^4 \cdot .3 = .36$
$P(\text{wins } 4/5 \mid \text{no play}) = \frac{5!}{4!} \cdot .5^4 \cdot .5 = .16$
$P(\text{wins } 4/5) = .16 \cdot .25 + .36 \times .75 = .31$
$P(\text{plays} \mid \text{win } 4/5) = \frac{.36 \cdot .75}{.31} = .87$ **87%**