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HW5: Probability Questions

1) 15 total events, 8-7 favorable events
$= \frac{7}{15} = \boxed{0.46}$

2) From 0-100, no such integers exist since the only starting odd digit is 1.
100-1000 has $5 \times 4 \times 5 = 100$
(odd first, odd second, even third)

1000-10,000 = $5 \times 4 \times 7 \times 5 = 7000$

10,000-99,000 = $5 \times 4 \times 7 \times 6 \times 5 = 4200$

total numbers that fit criterea = 5000
total integers from 0 to 99,999 is 10^5
so probability of getting a number that fits criterea is $\frac{5000}{10^5} = 0.05$.

Probability of generating exactly 5 out of 8
$= (0.05)^5 (1-0.05)^3 = \boxed{1.5004 \cdot 10^{-5}}$

3) $P(A) = 1/2$, $P(B) = 6/6^3 = 1/36$.

$P(A) \cdot P(B) = 1/72 = P(A \cap B)$, thus events are independent (no overlapping probability)

1) Flush: $\frac{\binom{52}{5}}{\binom{13}{5}\binom{4}{1}} = 0.00198$, $\frac{1}{0.00198} = \boxed{505 \text{ hands}}$
(52 choose 5 ← 5 hand; flush → (13 choose 5)(4 choose 1) ← with suits)

2) $P(\text{win} \mid \text{plays}) = 0.7$, $P(\text{win} \mid \text{doesn't play}) = 0.5$
$P(\text{plays}) = 0.75$, $P(4/5 \text{ wins} \mid \text{play}) = \binom{5}{4} \cdot 0.7^4 \cdot 0.3 = 0.36$
$P(\text{win } 4/5 \mid \text{no play}) = \binom{5}{4} \cdot 0.5^5 = 0.15625$, thus $P(\text{plays} \mid \text{win } 4/5)$
$= 0.36 \cdot 0.75 / P(\text{win } 4/5) = 0.36 \cdot 0.75 / 0.309 = \boxed{0.874 \text{ or } 87.4\%}$