1. $\frac{15}{15} \cdot \frac{14}{15} \cdot \frac{13}{15} \cdot \frac{12}{15} \cdot \frac{11}{15} \cdot \frac{10}{15} \cdot \frac{9}{15} \cdot \frac{8}{15}$

$= 0.1012$

$\boxed{10.12\% \text{ chance}}$

2. $\frac{5}{10} \cdot \frac{4}{10} \cdot \frac{7}{10} \cdot \frac{6}{10} \cdot \frac{5}{10} = \frac{1}{2} \cdot \frac{2}{5} \cdot \frac{7}{10} \cdot \frac{3}{5} \cdot \frac{1}{2}$

$\left(\frac{5 \cdot 4 \cdot 7 \cdot 6 \cdot 5}{100{,}000}\right)^5 \left(1 - \left(\frac{5 \cdot 4 \cdot 7 \cdot 6 \cdot 5}{100{,}000}\right)^3\right)\left(\frac{8}{5}\right) = \boxed{6.345 \times 10^{-6}}$

3. probability A:

$P(A_1) = \frac{3}{2} \cdot \frac{1}{4} \cdot \frac{1}{2} = \frac{3}{8}$

$P(A_2) = \frac{3}{3} \cdot \left(\frac{1}{2}\right)^3 \cdot \left(\frac{1}{2}\right)^0 = \frac{1}{8}$

$\frac{3}{8} + \frac{1}{8} = \frac{1}{2}$

yes these two scenarios are independent

probability B:

$\frac{6}{6} \cdot \frac{1}{6} \cdot \frac{1}{6}$

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

$P(A \cap B) = \frac{1}{6^3} + \frac{1}{6^3} + \frac{1}{6^3} = \frac{3}{6^3}$

$= \frac{1}{72}$

4. $\frac{52}{52} \cdot \frac{12}{51} \cdot \frac{11}{50} \cdot \frac{10}{49} \cdot \frac{9}{48}$

$= 1 \cdot \frac{11{,}880}{5{,}997{,}600} = 0.001981 = p$

$\frac{1}{p} = \frac{1}{0.001981} = \boxed{504.85}$

5. $p(s) = 0.75$

$p(w|s) = 0.7$

$p(w|s\emptyset) = 0.5$

when plays:

$\binom{5}{1} 0.70^4 \times (1-0.7) = 5 \times 0.7^4 \times 0.3 = 0.36015$

doesnt play

$\binom{5}{1} 0.5^4 \times (0.5) = 0.15625$

$p(s) \cdot p(c|s) + p(\text{doesnt}) \cdot p(c|\text{doesnt})$

$= 0.75(0.36015) + (0.25) \cdot (0.15625)$

$= 0.309175$

Bayes: $\dfrac{p(c|s) \cdot p(s)}{p(c)} = \dfrac{0.36015 \cdot 0.75}{0.309175}$

$= \boxed{87.37\%}$