Date No.

Probability Report #1
Tutorial problems

1. Sally & Molly have a box of 9 chocolates. 3 of them contain deadly poison. They pick in turn.

What's the probability if ~~Sally~~ ~~won~~

1) What's the probability of Sally surviving if she picks first.

$$P(S\ 1^{st}\ \text{survive}) = \frac{2}{3}$$

2) Sally surviving if she picks second and Molly is still alive?

$$\frac{6-1\ (\overset{\text{nondeadly}}{\text{normal}})}{9-1\ (\text{all chocolates})} = \frac{5}{8}$$

3) Sally surviving if she has to pick second & Molly is dead (Molly picks 1st → dies. game continues ⇒ will Sally ~~sop~~ survive 2nd turn)

$$\frac{6\ (\text{nondeadly})}{9-1\ (\text{all})} = \frac{3}{4}$$

4) Will Sally's chances of survival be higher if she picks 1st or 2nd (game takes 2 turns regardless of deaths)

1. If she picks first ⇒ $P(\text{survival}) = \frac{2}{3}$
2. If she picks second
   - 2.1 Molly survive ⇒ 2) ⇒ $P_1(\text{survival}) = \frac{5}{8}$
   - 2.2 Molly dies ⇒ 3) ⇒ $P_2(\text{survival}) = \frac{6}{8}$

Date . . No.

$\Rightarrow \mathbb{P}(\text{survival } 2^{nd}) = \frac{2}{3}\,\mathbb{P}_1(\text{survival}) + \frac{1}{3}\,\mathbb{P}_2(\text{survival}) =$

$= \frac{2}{3}$

$\Rightarrow$ It doesn't matter

2. In a shuffled deck with no Jokers, what's the probability of drawing a king if you've already drawn two in a row

$$\mathbb{P}(A|B) = \frac{\mathbb{P}(A \cap B)}{\mathbb{P}(B)} = \frac{\frac{13}{52} \cdot \frac{12}{51} \cdot \frac{11}{50}}{\frac{13}{52} \cdot \frac{12}{51}} = \frac{11}{50}$$