**1. True or false, and explain:**

**(a)** **If something has probability 1,000%, it is sure to happen.**

 Answer: Nothing can have probability 1000 percent -- probability values are restricted to zero to one, or to zero percent to 100 percent. Note that 1.00 = 100 percent, just as one dollar = 100 cents.

**(b) If something has probability 90%, it can be expected to happen about nine times as often as its opposite.**

 Answer: If something has probability 90 percent, it can be expected to happen about nine times as often as its opposite. Depends on whether “something” and “its opposite” are the only alternatives -- if they are mutually exclusive and collectively exhaustive, then yes, at least as the expected value of a sequence of random trials.

**2. The chance of A is 1/3; the chance of B is 1/10. True or false, and explain:**

**(a) If A and B are independent, they must also be mutually exclusive.**

 Answer: False. A and B can both happen together with chance (1/3) x (1/10). So they are not mutually exclusive.

**(b) If A and B are mutually exclusive, they cannot be independent.**

 Answer: True. If A happens, B automatically cannot happen (so the chance of it occurring is zero if A occurs) because they are mutually exclusive.

**3. Three cards are dealt from a well-shuffled deck.**

**(a) Find the chance that all of the cards are diamonds.**

 Answer: P(diamond, diamond, diamond) = $\frac{13}{52 }$ **x** $\frac{12}{51 }$**x** $\frac{11}{50}$**=**$\frac{1716}{132600}$ **≈0.0129**

**(b) Find the chance that none of the cards are diamonds.**

 Answer: P(not diamond, not diamond, not diamond) = $\frac{39}{52 }$ **x** $\frac{38}{51 }$**x** $\frac{37}{50}$**=**$\frac{54834}{132600}$ **≈0.414**

**(c) Find the chance that the cards are not all diamonds.**

 Answer: The chance of getting all diamonds is 0.0129 (from part (a)). The chance of not getting all diamonds is 1- 0.0129 **≈0.987**

**4. A die will be rolled 6 times. What is the chance of obtaining exactly 1 ace?**

 Answer: In this problem we'll use the binomial formula. We're looking for exactly 1 ace in 6 rolls.

 $\frac{6!}{1!5!}(\frac{1}{6})^{1}$ ($\frac{5}{6})^{5}$≈0.40 P(one ace in 6 rolls)

**5. A die will be rolled 10 times. The chance it never lands six can be found by one of the following calculations. Which one, and why?**

**(i) (**$\frac{1}{6})^{10}$ **(ii) 1-(**$\frac{1}{6})^{10}$ **(iii)**$(\frac{5}{6})^{10}$ **(iv) 1-**$(\frac{5}{6})^{10}$

 Answer: The chance of not getting a six in one roll is 5/6, and option (c) does it by the multiplication rule. (Or you can use the binomial formula).

**6. True or false: if a coin is tossed 100 times, it is not likely that the number of heads will be exactly 50, but it is likely that the percentage of heads will be exactly 50%. Explain**