1. The probability that the sum of the values of 2 die when thrown is equal to 11 is:

There are 36 (6*6)possibilites. Only two are equl to 11 ([5,6], [6,5]).

So anwer is 2/36 -> **1/18**

2. The probability that an ace is drawn on the second draw from a well shuffled pack of cards given that the first one was an ace is:

There are four aces in a set of standard cards. So one already taken. so 3 aces and 51cards left .

The probability to get one ace from the remaining cards are : **3/51**

The question didn't mention whether it is with-replacement or without-replacement. I assumes it is without-replacement

3. A family has two children. Given that one of the children is a boy, what is the probability that both children are boys?

The question bit confusing: See this and this.

~~There are total four possibilities: (B,B), (B, G), (G,B), (G,C)~~ ~~But one of the children is a boy: So (B,B), (B,G), (G,B)~~ ~~Then chance of both boys: 1/3~~

I wrote the answer as 1/2

I was wrong!? Accpted answer was 1/3

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4. Which of the following statements is true?

The sum of probabilities of mutually exclusive and collectively exhaustive events must be 1.

- https://math.stackexchange.com/questions/2507677/if-a-and-b-are-independent-events-they-are-mutually-exclusiveproof-for-why-its

5. If the random variable X follows the below distribution, what is the value of c?

f(x) = cx^3 Integration of the f(x) over the interval should give 1. So c= **4**

see an example

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6. Which of the following statements is true with regards to the probability distribution function f(x) of a random variable X?

Didn't mention whether it is discreate or continous. So we need to account for both.

Lower value of f(x) is 0 for p.d.f and p.m.f.

f(x) can be more than 1 in case of continous R.V.

So answer is: **f(x) must be non-negative for all values of x**

Ref

7. An image is represented as a vector x. We wish to classify the image in one of 3 classes -- a cat, a dog or neither.

Option 1 is CORRECT: sum of hk = 1

Sum of the probability should be 1.

Option 4 is WRONG: hk = p(hk=1)

What is p(hk=1) ? It is called prior probability in bayesian inference. Basically it says what is the probability of an image being a cat/dog/neither. That can be calculated if we have the population/sample data. No such data given in the question. For example, assume we know that there are 12 cats, 13 dogs and 14 other animals in the world . Then what is the probability of an animal being cat, dog, or other animals? Obviously 12/39, 13/39 and 14/39 respectively. (I think we can consider an uniform distribution in this scenario since we don't have any population/sample data. i.e. hk=1/3).

Option 2 is CORRECT: hk = p(yk=1|x)

It says that hk is the probability of yk=1 for the given image. The question talks about the conditional probability "it means that the given image has a probability of 0.7 that it is a cat". We get the following: hCAT = p(yCAT=1|x) hDOG = p(yDOG=1|x) hNEITHER= p(yNEITHER=1|x) So general form above three equations: hK = p(yK = 1 | x)

Option 3 is WRONG: hk = p(yk=0|x)

This option contradicts the option 2. It says hk is the probability of yk=0 given that the image data.

8. If a fair coin is tossed 4 times, what is the expected number of heads?

It is binomial distribution here n is 4 and p is 1/2. The mean of binomial distribution is: np -> 4*1/2 = **2**

9. Given two random variables X and Y, which of the following equations hold true?

third (covariance is zero) and fourth (E[X+Y]) options. See

10. What is the expected value of the random variable X with probability distribution function given

here f(x) is 3/8*x^2. Expected value calculated as given below

$$\mathrm{E}[X] = \int_{\mathbb{R}} x f(x)\, dx.$$

So need find the integral of 3/8*x^3 over [0,2]

Answer: 3/2