

a)

For the dataset of 250 images, there are 2^{250} distinct hypotheses as it is a binary outcome: if an image contains a cat or not.

b)

In short, the probability would be very low as there are so many possible hypotheses and stating here that only one would be the one to match perfectly among the 150 images would yield a probability of $(\frac{1}{2})^{150}$.

c)

Now, we have found the hypothesis that fits the 150 images training data perfectly, however now how would it compare to 100 images testing data? Once again, if the testing data images are truly independent from the training data images, then the probability of perfectly fitting the testing set will continue to still be low. There is no guarantee that because the hypothesis fits the training data perfectly does not mean it will fit the testing data perfectly.