Homework # 2

3. (e)

As per the bin model shown by the prof. for the learning problem, let for the deterministic function f, the hypothesis h be as follows

R G G G R G R G G G

where R represents that the hypothesis was incorrect at that point, i.e. $h(\mathbf{x}) \neq f(\mathbf{x})$. The probability of picking a red marble is given as μ from the problem, thus the probability of getting it correct is $1 - \mu$.

Now, we are considering a noisy target function. As per the problem, the probability of getting the same output as the target function for a given $\mathbf{x}$ is λ.

Now an error is made if the hypothesis predicts makes an error in estimating the target function while the noisy version of the target function is correct, or when the hypothesis does not make an error in estimation but the noisy target function does not match its deterministic counterpart.
Thus, the result can be calculated as $(1 - \lambda) * (1 - \mu) + \lambda * \mu$

4. (b)

This can simply be calculated by getting the an equation in terms of μ such as

$$1-\mu-\lambda+\lambda\mu+\lambda\mu \Rightarrow 1-\lambda+(2\lambda-1)\mu$$

Put the coefficient of μ to get the answer.