Question Exam Bayes

- Suppose we decide to use Bayes' Rule to attempt a classification task for the Iris dataset. Using the formula of Bayes' Rule as a guide, explain the steps you would use to attempt a classification.

1) Formula + name it (likelyhood, prior probability)

$$P(w_j|x) = \frac{p(x|w_j)\,P(w_j)}{P(x)}$$

$P(w_j|x)$: Posterior Probability; $P(x)$: evidence or marginal likelyhood

$$P(x) = \sum_{j=1}^{j} p(x|w_1)\,P(w_j)$$

2) The three kinds of Iris flowers become three classes such as w_1, w_2, w_3 and the term $P(w)$ is a prior; this is for example the probability that an Iris Sentosa is in the data set. As there are 50 flowers of each this would be one third.
The symbol x is a feature and as such we have four features, so we need x_1, x_2, x_3, x_4. We will end up having things such as $p(x_1|w_1)$ and these are well referred to as likelihoods. These have to be modelled independently and are most likely to be the hardest part, as we may need to build density probability functions out of the data. With all this information, we will get what is called a posterior. But, the rule won't give a classification; we can use these probabilities to make a decision based on some sort of cost function; this will be the classifier itself.