Problem Set 2

Person	Rent ($)	Clean	Satisfied?
p1	600	Yes	Yes
p2	500	No	Yes
p3	400	No	Yes
p4	1000	Yes	No
p5	700	No	No
p6	1200	Yes	No
p7	800	Yes	Yes
p8	600	No	Yes

Table 1: Training Data.

Person	Rent ($)	Clean	Satisfied?
p9	1100	Yes	No
p10	500	Yes	Yes
p11	1300	No	Yes
p12	550	No	Yes

Table 2: Test Data.

1. **Decision Tree (10 points)**:
   (a) Show the decision tree that results from using the training data shown in Table 1 with the entropy measure to split features. For full credit, you must show the key mathematical steps towards developing your tree.
   (b) Report prediction results for the test data shown in Table 2.
   (c) Evaluate the prediction results by reporting the precision and recall.
   (d) Evaluate the prediction results by showing a confusion matrix.
2. **Naive Bayes (10 points)**:
   (a) Show the result of training a Gaussian Naive Bayes model using the training data shown in Table 1, with only the "Rent" feature (ignore the "Clean" feature). Show the key mathematical steps to derive all class probabilities (i.e., $P(C_i)$) and likelihoods of features given the two classes (i.e., $P(feature|C_i)$).
   (b) Report prediction results for the test data shown in Table 2.
   (c) Evaluate the prediction results by reporting the precision and recall.
   (d) Evaluate the prediction results by showing a confusion matrix.
3. **Classification Models (5 points)**: In your own words, describe the difference between a generative model and a discriminative model