# Module 4 Quiz

**TOTAL POINTS 10**

1. Which of the following is an example of clustering?    [1 point]

   - ◉ Separate the data into distinct groups by similarity
   - ○ Compress elongated clouds of data into more spherical representations
   - ○ Accumulate data into groups based on labels
   - ○ Creating a new representation of the data with fewer features

2. Which of the following are advantages to using decision trees over other models? (Select all that apply)    [1 point]

   - ☐ Trees are naturally resistant to overfitting
   - ☐ Decision trees can learn complex statistical models using a variety of kernel functions
   - ☑ Trees often require less preprocessing of data
   - ☑ Trees are easy to interpret and visualize

3. What is the main reason that each tree of a random forest only looks at a random subset of the features when building each node?    [1 point]

   - ○ To increase interpretability of the model
   - ◉ To improve generalization by reducing correlation among the trees and making the model more robust to bias.
   - ○ To reduce the computational complexity associated with training each of the trees needed for the random forest.
   - ○ To learn which features are not strong predictors

4. Which of the following supervised machine learning methods are greatly affected by feature scaling? (Select all that apply)    [1 point]

   - ☐ Naive Bayes
   - ☑ Support Vector Machines
   - ☑ Neural Networks
   - ☑ KNN
   - ☐ Decision Trees

5. Select which of the following statements are true.    [1 point]

   - ☐ For a fitted model that doesn't take up a lot of memory, **KNN** would be a better choice than **logistic regression.**
   - ☐ For having an audience interpret the fitted model, a **support vector machine** would be a better choice  than a **decision tree**.
   - ☑ For a model that won't overfit a training set, **Naive Bayes** would be a better choice than a **decision tree.**
   - ☑ For predicting future sales of a clothing line, **Linear regression** would be a better choice than a **decision tree regressor**.

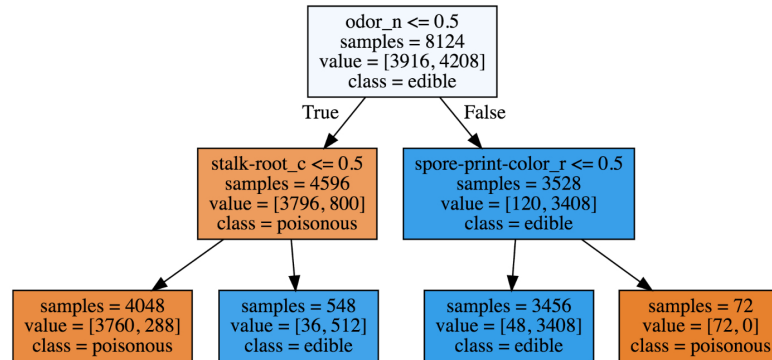6. Match each of the prediction probabilities decision boundaries visualized below with the model that created them.    [1 point]
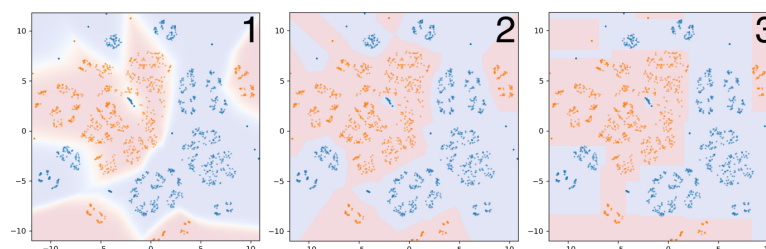
○ 1. Neural Network
  2. Decision Tree
  3. KNN (k=1)

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◉ 1. Neural Network
  2. KNN (k=1)
  3. Decision Tree

7. A decision tree of depth 2 is visualized below. Using the `value` attribute of each leaf, find the accuracy score for the tree of depth 2 and the accuracy score for a tree of depth 1.

**1 point**

odor_n <= 0.5
samples = 8124
value = [3916, 4208]
class = edible

True | False

stalk-root_c <= 0.5
samples = 4596
value = [3796, 800]
class = poisonous

spore-print-color_r <= 0.5
samples = 3528
value = [120, 3408]
class = edible

samples = 4048
value = [3760, 288]
class = poisonous

samples = 548
value = [36, 512]
class = edible

samples = 3456
value = [48, 3408]
class = edible

samples = 72
value = [72, 0]
class = poisonous

What is the improvement in accuracy between the model of depth 1 and the model of depth 2? (i.e. accuracy2 - accuracy1)

0.06745

8. For the autograded assignment in this module, you will create a classifier to predict whether a given blight ticket will be paid on time (See the module 4 assignment notebook for a more detailed description). Which of the following features should be removed from the training of the model to prevent data leakage? (Select all that apply)

**1 point**

☐ ticket_issued_date - Date and time the ticket was issued

☑ collection_status - Flag for payments in collections

☐ grafitti_status - Flag for graffiti violations

☑ compliance_detail - More information on why each ticket was marked compliant or non-compliant

☐ agency_name - Agency that issued the ticket

9. Which of the following might be good ways to help prevent a data leakage situation?

**1 point**

☑ If time is a factor, remove any data related to the event of interest that doesn't take place prior to the event.

☐ Ensure that data is preprocessed outside of any cross validation folds.

☑ Remove variables that a model in production wouldn't have access to

☑ Sanity check the model with an unseen validation set

10. Given the neural network below, find the correct outputs for the given values of x1 and x2.

**1 point**

The neurons that are shaded have an activation threshold, e.g. the neuron with *>1?* will be activated and output 1 if the input is greater than 1 and will output 0 otherwise.

$x_1$

2

>1?

2

2

>3?

○
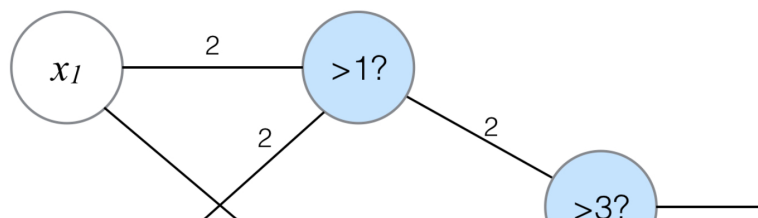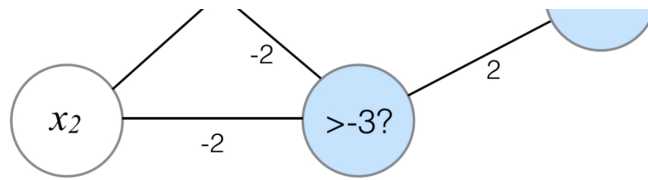
| x1 | x2 | output |
|----|----|--------|
| 0 | 0 | 0 |
| 0 | 1 | 0 |
| 1 | 0 | 0 |
| 1 | 1 | 1 |

○

| x1 | x2 | output |
|----|----|--------|
| 0 | 0 | 0 |
| 0 | 1 | 1 |
| 1 | 0 | 1 |
| 1 | 1 | 1 |

◉

| x1 | x2 | output |
|----|----|--------|
| 0 | 0 | 0 |
| 0 | 1 | 1 |
| 1 | 0 | 1 |
| 1 | 1 | 0 |

○

| x1 | x2 | output |
|----|----|--------|
| 0 | 0 | 1 |
| 0 | 1 | 0 |
| 1 | 0 | 0 |
| 1 | 1 | 1 |

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