Module 4: Answers

1. What type of Machine Learning has unlabeled data, but the system learns from feedback on its actions?

Reinforcement Learning

2. A machine learning model produces 40 true positives, 10 false positives, and 30 true negatives on 100 training examples. What is the precision and recall?

- **Precision: .8**
- **Recall: .66**

3. A model has an accuracy of 95% on training data, but only 55% accuracy on test data. Qualitatively, what is the bias (high/low) and variance (high/low)?

Low Bias, High Variance

4. What are some relevant features for building a model that predicts where someone will enjoy a movie?

Any of the following would be acceptable

- **How many friends of the person enjoyed the movie**
- **Number of actors in the movie that the person likes**
- **Whether the person likes the genre of that movie**
- **Critics rating of the movie**

5. Consider a fully-connected Neural Network with 10 input neurons, two hidden layers each with 30 neurons, and an output layer with 3 neurons. How many weights are in this Neural Network (ignore any bias terms)?

10 x 30 x 30 x 3 = 27,000

6. Consider a Neural Network that receives a 10 by 10 image and applies a convolution layer with 7 filters, a kernel size of 3, and a stride of 1. Assume that network pads the image with zeros, and that each of these zeros is included in the multiplications. How many individual multiplication operations are applied?

(10 x 10) x (3 x 3) x 7 = 6,300

7. What is an example of an activation function for a Neural Network?

Any of the following are acceptable:

- **Rectified Linear Activation (ReLU)**
- **Hyperbolic Tanger (tanh)**
- **Sigmoid**

8. What is Gradient Descent used for in Neural Networks?

Gradient Descent is used to minimize the error of the Neural Network during training.

9. What syntax is used to specify model definitions in Caffe?

Protocol Buffer

10. In Caffe, what layers are used for training a Neural Network that are not used in the deployed Neural Network?

- **data layers (perform cropping and subtraction of image means)**
- **accuracy layer**
- **loss layer**