**QUESTION 1**

1. In PAC-learning, what do ε and δ represent?

|  |  |  |
| --- | --- | --- |
|  | A. | ε is the confidence in the approximation. δ is the derivative of the error function. |
|  | B. | ε is an error bound. δ is the bias. |
|  | C. | ε is the sample complexity. δ is the likelihood of the model. |
|  | D. | ε is the statistical bias. δ is the variance in the estimate. |
|  | E. | ε is the error in the approximation. δ is the confidence in that approximation. |

**10 points**

**B (or E?)**

**QUESTION 2**

1. Tree-augmented Naïve Bayes attempts to improve classification accuracy by relaxing the underlying assumptions of the basic Naïve Bayes model. Which of the following modifications that TAN applies will guarantee it always performs better than Naïve Bayes

|  |  |  |
| --- | --- | --- |
|  | A. | Using mutual information to detect dependencies. |
|  | B. | There is no relaxation that can guarantee improved performance. |
|  | C. | Naïve Bayes is so simplistic that any reasonable relaxation will guarantee improved performance. |
|  | D. | Introducing attribute dependencies. |
|  | E. | Learning model structure by finding the maximum spanning tree. |

**10 points**

**E  
Try D**

**QUESTION 3**

1. What is the purpose of adding a regularization term to a loss function?

|  |  |  |
| --- | --- | --- |
|  | A. | Regularization makes the loss function convex. |
|  | B. | Regularization enables multi-objective optimization. |
|  | C. | Regularization smooths out the loss function to avoid pathological cases. |
|  | D. | Regularization introduces a bias to help overcome limitations of the chosen model type. |
|  | E. | Regularization penalizes the loss function based on model complexity to minimize overfitting. |

**10 points**

**C**

**Def E**

**QUESTION 4**

1. Which of the following best describes a learning situation where the learner queries a teacher or oracle with a specific example and revises the current hypothesis based on the answer?

|  |  |  |
| --- | --- | --- |
|  | A. | Supervised learning |
|  | B. | Unsupervised learning |
|  | C. | Teacher-annotated learning |
|  | D. | Active learning |
|  | E. | Helpful teacher learning |

**10 points**

**B (try A)**

**QUESTION 5**

1. Which of the following is an example of representation bias?

|  |  |  |
| --- | --- | --- |
|  | A. | Empirical risk minimization |
|  | B. | Least squares regression |
|  | C. | Lagrange multipliers |
|  | D. | Maximum *a posteriori* hypothesis |
|  | E. | Univariate decisions |

**10 points**

**E**

**QUESTION 6**

1. What does Bayes Decision Theory attempt to optimize when making a decision?

|  |  |  |
| --- | --- | --- |
|  | A. | Recall. |
|  | B. | Area under the precision-recall curve. |
|  | C. | Expected Risk |
|  | D. | Precision |
|  | E. | Expected error. |

**10 points**

**D**

**Try C**

**QUESTION 7**

1. Which of the following is an example of preference bias?

|  |  |  |
| --- | --- | --- |
|  | A. | No free lunch |
|  | B. | Maximum likelihood estimation |
|  | C. | Linear discriminant |
|  | D. | Nested hypercubes |
|  | E. | Conditional independence |

**10 points**

**C**

**(Not A)**

**I like B**

**QUESTION 8**

1. Naïve Bayes exploits which of the following as a defining property?

|  |  |  |
| --- | --- | --- |
|  | A. | Simple counting. |
|  | B. | Attributes being conditionally independent given the class. |
|  | C. | The class being independent given the attributes. |
|  | D. | Attribute independence. |
|  | E. | Class independence. |

**10 points**

**A**

**Nah, B**

**QUESTION 9**

1. Which of the following corresponds to Bayes' Rule?

|  |  |  |
| --- | --- | --- |
|  | A. |  |
|  | B. |  |
|  | C. |  |
|  | D. |  |
|  | E. |  |

**10 points**

**B**

**QUESTION 10**

1. What assumptions are generally made when doing maximum likelihood estimation?

|  |  |  |
| --- | --- | --- |
|  | A. | The data is noise free. |
|  | B. | The data is i.i.d. |
|  | C. | The data is drawn according to a normal distribution. |
|  | D. | Any noise in the data is distributed according to a normal distribution. |
|  | E. | The data is counted to derive the target parameters. |
|  |  |  |

D

Its B