

CS-171, Intro to A.I. — Quiz #4 — Fall Quarter, 2015 — 20 minutes

YOUR NAME: _____

YOUR ID: _____ ID TO RIGHT: _____ ROW NO.: _____ SEAT NO.: _____

1. (40 pts total, 4 pts each) Machine Learning concepts.

For each of the following items on the left, write in the letter corresponding to the best answer or the correct definition on the right. The first one is done for you as an example.

A .	Learning	A	Improves performance of future tasks	See the first sentence of Chapter 18.
J	Information Gain	B	Fixed set, list, or vector of features/attributes paired with	See Section 18.1.
H	Decision Boundary	C	Tests $P(C) \prod_i P(X_i C)$, where C is a class label and X_i are	See Section 20.2.2.
G	Cross-validation	D	Tests $\mathbf{w} \cdot \mathbf{f} > 0$, where \mathbf{w} is a weight vector and \mathbf{f} is a feature	See Section 18.7.
D	Linear Classifier (Perceptron)	E	Example input-output pairs, from which to discover a hypothesis	
B	Factored Representation (Feature Vector)	F	Examples distinct from training set, used to estimate accuracy	See Section 18.2.
K	Overfitting	G	Randomly split the data into a training set and a test set	See Section 18.4.1.
F	Test Set	H	Surface in a high-dimensional space that separates the classes	See Section 18.6.3.
C	Naïve Bayes Classifier	I	Internal nodes test a value of an attribute, leaf nodes=class	See Section 18.3.
E	Training Set	J	Expected reduction in entropy from testing an attribute value	See Section 18.3.4.
I	Decision Tree	K	Choose an over-complex model based on irrelevant data	See Section 18.3.5.

**** TURN QUIZ OVER. QUIZ CONTINUES ON THE REVERSE. ****

2. (40 pts total, 4 pts each) CONSTRAINT SATISFACTION PROBLEM (CSP)

CONCEPTS. For each of the following terms on the left, write in the letter corresponding to the best answer or the correct definition on the right.

G	Minimum Remaining Values Heuristic	A	Set of allowed values for some variable	See Section 6.1.
H	Degree Heuristic	B	Specifies the allowable combinations of variables	
J	Min-Conflicts Heuristic	C	Every variable is associated with a value	
E	Solution to a CSP	D	The values assigned to variables do not violate any constraints	
I	Least Constraining Value Heuristic	E	A complete and consistent assignment	
A	Domain	F	Nodes correspond to variables, links connect variables that participate in a constraint	See Section 6.1.1.
B	Constraint	G	Chooses the next variable to expand to have the fewest legal values in its domain	See Section 6.3.1.
D	Consistent Assignment	H	Chooses the next variable to expand to have the fewest constraints on other unassigned variables	See Section 6.3.1.
C	Complete Assignment	I	Prefers the value that rules out the fewest choices for the neighboring variables in the constraint graph	
F	Constraint Graph	J	Select the value that results in fewest conflicts with neighboring variables	See Section 6.4.

3. (20 pts total, 4 pts each) Machine Learning. Label the following statements T (true) or F (false).

3a. T A decision tree can learn and represent any Boolean function. See Section 18.3.2.

3b. F The information gain from an attribute A is how much classifier accuracy improves when attribute A is added to the example feature vectors in the training set. See Section 18.3.4.

3c. T Overfitting is a general phenomenon that occurs with most or all types of machine learning. See Section 18.3.5.

3d. F Cross-validation is a way to improve the accuracy of a learned hypothesis by reducing over-fitting using Ockham's razor. See Section 18.4.1.

3e. T An agent is learning if it improves its performance on future tasks after making observations about the world. See the first sentence of Chapter 18.