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 after observing the world
	Information Gain	B	Fixed set, list, or vector of features/attributes paired with a value
	Decision Boundary	C	Tests P (C) Π_i P(X_i | C), where C is a class label and X_i are features
	Cross-validation	D	Tests **w**·**f**>0, where **w** is a weight vector and **f** is a feature vector
	Linear Classifier (Perceptron)	E	Example input-output pairs, from which to discover a hypothesis
	Factored Representation (Feature Vector)	F	Examples distinct from training set, used to estimate accuracy
	Overfitting	G	Randomly split the data into a training set and a test set
	Test Set	H	Surface in a high-dimensional space that separates the classes
	Naïve Bayes Classifier	I	Internal nodes test a value of an attribute, leaf nodes=class labels
	Training Set	J	Expected reduction in entropy from testing an attribute value
	Decision Tree	K	Choose an over-complex model based on irrelevant data patterns

****** 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.

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

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

3a. _____ A decision tree can learn and represent any Boolean function.

3b. _____ 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.

3c. _____ Overfitting is a general phenomenon that occurs with most or all types of learners.

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

3e. _____ An agent is learning if it improves its performance on future tasks after making observations about the world.