<u>#</u> Exam 3

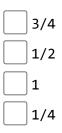
Name or ID: _____

📕 Question 1

[1 points] Given the following confusion matrix, what is the precision for class Dragon?

 \equiv

Class \ Predict	Cat	Dog	Dragon
Cat	40	10	0
Dog	10	20	10
Dragon	0	0	30



Question 2

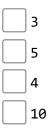
[1 points] What is matrix.argmax(axis = 1), where matrix = numpy.array([[1, 2, 3], [4, 5, 6]])?

- [2, 2]
- [1, 1, 1]
- [2, 2, 2]
- [3, 3]



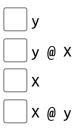
[1 points] There are 4 documents, and 3 of these documents contain the token "Groot". In document 1, there are 10 tokens in total, and 5 of them are "Groot". What is the bag of words feature (without normalization) of document 1 feature "Groot"?

 \equiv



Question 4

[1 points] What is a valid simplification of numpy.linalg.solve(X, X @ y), assuming the code runs without error (and numerical instability)?



2	

Question 5 [1 points] The shape of A is (3, 2), the shape of B is (3, 3), and the shape of C is (4, 3). What is the shape of A @ B @ C?

 \equiv



- (2, 4)
- Question 6

[1 points] If x0 has two columns, and x =

sklearn.preprocessing.PolynomialFeatures(2).fit_transform(x0) is used as the design matrix, how many weights (include coefficients and biases or intercepts) will a linear regression estimate?

4
6
5
2



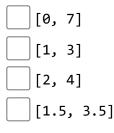
[1 points] df has 10 columns and 5 rows. After applying p = PCA(3) and p.fit(df), what is the shape of p.components_? Note: the rows of p.components_ are the principal components.

 \equiv



📕 Question 8

[1 points] Given points [[1], [2], [3], [4]] and starting centroids [0] and [7], what are the centroids after the first iteration of assigning points and updating centroids, using the iterative K-Means Clustering algorithm with Manhattan distance?





[1 points] The gradient vector dw at [w1, w2, w3, w4] = [-1, 1, 2, -2] is [2, -2, -1, 1], if gradient descent w = w - alpha * dw is used, which variable will increase by the largest amount in the next iteration?

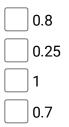
 \equiv



Question 10

[1 points] Suppose dxy = skimage.filters.sobel(img) produces the dxy matrix in the following table. To highlight the edge pixels in the original image in green, image[dxy > t] = [0, 255, 0] is used, and 2 pixels are highlighted. Which value of t is used?

0	0	0	0
0	1	1	0
0	0.5	0.75	0
0	0	0	0

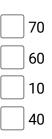




[1 points] One-vs-one support vector machines are trained and produce the following the confusion matrix. How many training items are used in training the "0 vs 2" support vector machine?

 \equiv

Count	Predict 0	Predict 1	Predict 2
Class 0	10	20	10
Class 1	0	10	0
Class 2	10	0	10



Question 12

[1 points] The 3-fold cross validation accuracy for four different neural networks is summarized below. Which model is the most preferred one based on cross validation accuracy?

Network	Fold 1 accuracy	Fold 2 accuracy	Fold 3 accuracy
W	0.5	0.5	0.5
X	0.6	0.8	1
Y	0.7	0.8	0.9
Z	0.8	0.8	0.8





[1 points] What is the optimal solution [x1, x2] to the linear program max x1 + 2 * x2 subject to x1 + x2 <= 1 and x1 >= $0 \times 2 = 0$?

 \equiv



- [0, 0]
- [1, 0]
- [0, 1]

Question 14

[1 points] Suppose the standard form of a linear program max c @ x subject to A @ x <= b and x >= 0 has len(c) = 5, A.shape = (3, 5), and len(b) = 3. What is the number of dual variables len(y)? Note: the dual problem is min b @ y subject to A' @ y >= c and y >= 0 where ' means transpose.





[1 points] Suppose all the random vectors generated from a multivariate normal distribution are on the same line, using numpy.random.multivariate_normal([0, 0], [[1, c], [c, 4]], 1000). What is the value of c?

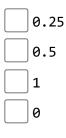
 \equiv



Question 16

[1 points] Consider a Markov chain with the following transition matrix with three states [0, 1, 2]. What is the probability a sequence [0, 0, 2] is observed (given it starts with 0)?

From \ To	0	1	2
0	1	0	0
1	0	0.5	0.5
2	0.5	0	0.5





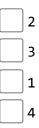
[1 points] For a logistic regression lr, if lr.predict_proba(x) for some item x is [0.3, 0.5, 0.2], what is lr.predict(x) for the same x?

 \equiv



Question 18

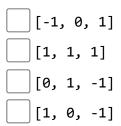
[1 points] What is the complete linkage Manhattan distance between c1 = [[5], [4], [0]] and c2 = [[2], [1]]? Note: c1 is a cluster with 3 points and c2 is a cluster with 2 points.





[1 points] Given the principal components u1 = [0, 0, 1], u2 = [1, 0, 0], u3 = [0, 1, 0], and the PCA (principal component analysis) features of an item x is <math>y = [-1, 0, 1], what is x?

 \equiv



Question 20

[1 points] If you think any of the questions are not clear or incorrect, please explain here; otherwise, enter "none". Please do not leave the answer blank:



END OF EXAM

Last Updated: December 18, 2023 at 9:30 PM

 \equiv



UNIVERSITY OF WISCONSIN-MADISON

Powered by w3.css