

Homework 8

Problem 1

d is the correct answer.

w has d number of variables and then we can also vary the constant b , so thus we have $d + 1$ variables, or choice **d**.

Problem 2

a is the correct answer.

See attached code. After running the code, I got that the highest E_{in} came from 0 versus all which had an $E_{in} = 0.16376354409546015$.

Problem 3

a is the correct answer.

See attached code. After running the code, I got that the lowest E_{in} came from 1 versus all which had an $E_{in} = 0.015772870662460567$

Problem 4

c is the correct answer.

See attached code. After running the code, I got $2390 - 536 = 1854$ support vectors, closest to answer choice **c**.

Problem 5

d is the correct answer.

See attached code. After running the code, I got that when $C = 1$, the lowest E_{in} of 0.004484304932735426 .

Problem 6

b is the correct answer.

See attached code. I ran the `svm1.versus()` method with $\text{degree} = 2$ and $\text{degree} = 5$ and $C = 0.001$. I found that the number of support vectors for $Q = 2$ is 152 while the number of support vectors for $Q = 5$ is 28, giving answer choice **b**.

Problem 7

b is the correct answer.

See attached code. For each run, I returned the C value that minimized E_{CV} and added it to a list. The mode of this list was 0.001, answer choice **b**.

Problem 8

c is the correct answer.

See attached code. For each run, in addition to the C value, I would also return E_{CV} and found that the average of these errors is 0.004522292993630573, closest to answer choice c.

Problem 9

e is the correct answer.

See attached code. The lowest E_{in} of the possible options came from $C = 10^6$. The value of the error is 0.0012812299807815502.

Problem 10

c is the correct answer.

See attached code. Repeating the process in problem 9, but using the testing set for prediction, we found that the lowest E_{out} comes when $C = 100$. $E_{out} = 0.018867924528301886$.