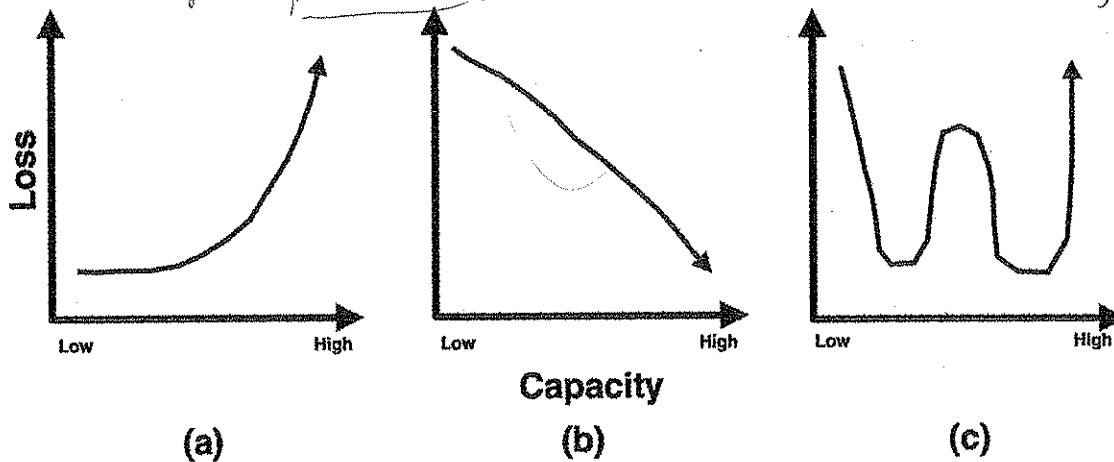Oct 2nd, 2017   Name: _Jie Wang_

Instructions: Only the final answer for each question will be graded, with no partial credit. If you do any intermediate calculations, please draw a box around your final answer. For each minute late the quiz is turned in, 20% credit will be subtracted from your final score.

1   Loss versus model capacity

Draw a box/circle around answer below

1. (0.5) For curve (a) is this possible as a training curve?   YES   NO

2. (0.5) For curve (a) is this possible as a validation curve?   YES   NO

3. (0.5) For curve (b) is this possible as a training curve?   YES   NO

4. (0.5) For curve (b) is this possible as a validation curve?   YES   NO

5. (0.5) For curve (c) is this possible as a training curve?   YES   NO

6. (0.5) For curve (c) is this possible as a validation curve?   YES   NO

2 K-NN and cross validation

Use only Euclidean distance to compute distance to neighbors

Points	X1	X2	Y
1	1	1	0
2	1	2	2
3	3	1	1
4	3	2	0
q	5	1	?

(3,1)
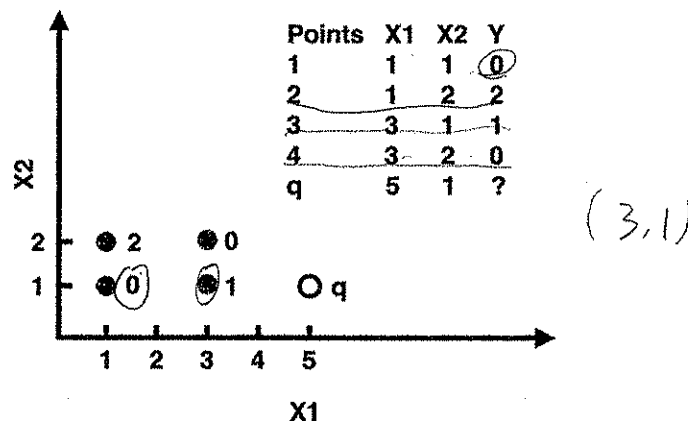
1. (0.5) What would the K-NN predict for query point q with K=1?

   1

2. (0.5) What would the K-NN predict for query point q with K=2?

   $\frac{1}{2}$

3. (0.5) What would the K-NN predict for query point q with K=3?

   $\frac{1}{3}$

4. (0.5) What would the K-NN predict for query point q with K=4?

   $\frac{3}{4}$

5. (1.5) If doing leave-one-out cross-validation, what would the prediction be for point 1 using squared error? (First, you will need to pick the best k using leave-one-out-cross-validation using just points 2, 3, 4; second, use the best k to make a prediction for point 1)

   $\frac{3}{2}$

6. (1.5) If doing leave-one-out cross-validation, what would the prediction be for point 4 using squared error?

   $\frac{3}{2}$

7. (2) If doing leave-one out cross-validation using squared error, what would the mean loss be for k = 1?

   $\frac{5}{2}$.

2