Q2-1: Table shows all the training points in 2D space and their labels. Assume 3NN classifier and Euclidean distance. What should be the labels of the points A: (1, 1) and B(2, 1)?

1. A: +, B: -
2. A: -, B: +
3. A: -, B: -
4. A: +, B: +

x	y	label
0	0	+
1	0	+
2	0	+
2	2	+
0	1	-
0	2	-
1	2	-
3	1	-

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1. A: +, B: -
2. A: -, B: + ⬅
3. A: -, B: -
4. A: +, B: +

3 nearest neighbors to point A are (0, 1) [-], (1, 0) [+], (1, 2) [-]. Hence, the label should be **[-]**

3 nearest neighbors to point B are (2, 0) [+], (2, 2) [+], (3, 1) [-]. Hence, the label should be **[+]**

x	y	label
0	0	+
1	0	+
2	0	+
2	2	+
0	1	-
0	2	-
1	2	-
3	1	-

Q2-2: In a distance-weighted nearest neighbor, which of the following weight is **NOT** appropriate? Let p be the test data point and x_i {i = 1: N} be training data points.

1. $w_i = d(p, x_i)^{½}$
2. $w_i = d(p, x_i)^{-2}$
3. $w_i = \exp(-d(p, x_i))$
4. $w_i = 1$

Q2-2: In a distance-weighted nearest neighbor, which of the following weight is **NOT** appropriate? Let p be the test data point and x_i {i = 1: N} be training data points.

1. $w_i = d(p, x_i)^{1/2}$
2. $w_i = d(p, x_i)^{-2}$
3. $w_i = \exp(-d(p, x_i))$
4. $w_i = 1$

The intuition behind weighted kNN, is to give more weight to the points which are nearby and less weight to the points which are farther away. Any function whose value decreases as the distance increases can be used as a function for the weighted knn classifier. w = 1 is also **OK** as it reduces to our traditional nearest-neighbor algorithm.