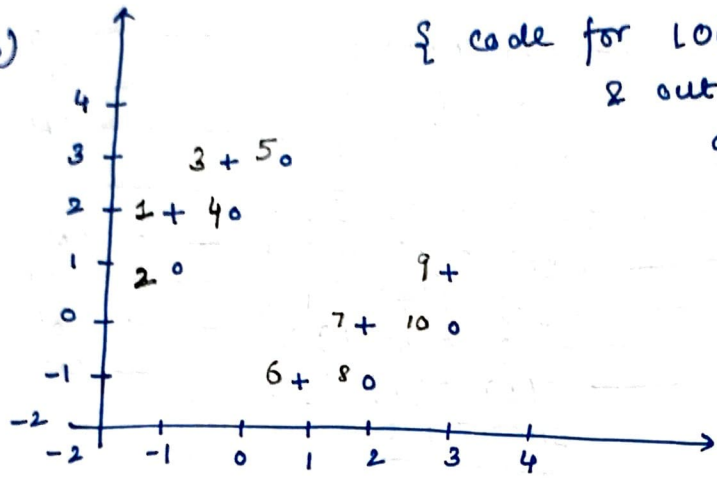
ANSWER 2

(A) {code & output Attached}

(B)



{ code for LOOCV Error & output also attached }

K = 1 / 1NN

point 1 : nearest neighbors point 2 and 4 both 'o'
1 → 'o', actual '+'

point 2 : nearest neighbor point 1 '+'
2 → '+', actual 'o'

point 3 : nearest is point 4/5, both 'o'
3 → 'o', actual '+'

point 4 : nearest points 1/2 both '+'
4 → '+', actual 'o'

point 5 : nearest point 3 '+'
5 → '+', actual 'o'

point 6 : nearest point 8 'o'
6 → 'o', actual '+'

point 7 : nearest points 8/10 both 'o'
7 → 'o', actual '+'

point 8 : nearest points 6/7 both '+'
8 → '+', actual 'o'

point 9 : nearest neighbor 10 'o'
9 → 'o', actual '+'

point 10 : nearest neighbor 7/9 both '+'
10 → '+', actual 'o'

→ 1NN predicts all points wrong i.e. **Error = 1.0**

K = 3 | 3NN

point	Nearest Points (class)	Predicted class
1	2(o), 3(+), 4(o)	'o'
2	1(+) 3(+) 4(o)	'+'
3	1(+) 4(o) 5(o)	'o'
4	1(+) 3(+) 5(o)	'+'
5	1(+) 3(+) 4(o)	'+'
6	7(+) 8(o) 10(o)	'o'
7	6(+) 8(o) 10(o)	'o'
8	6(+) 7(+) 9(o)	'+'
9	7(+) 8(o) 10(o)	'o'
10	9(+) 7(+) 8(o)	'+'

Error = 1.0

K = 5 | 5NN

point	Nearet Points (class)	Predicted class
1	2(o) 3(+) 4(o) 5(o) 6(+)	'o'
2	1(+) 3(+) 4(o) 5(o) 6(+)	'+'
3	1(+) 2(o) 4(o) 5(o) 6(+)	'o'
4	2(o) 1(+) 3(+) 5(o) 6(+)	'+'
5		'+'
6	. . . .	'o'
7	(computed	'o'
8	using code	'+'
9	for higher	'o'
10	values)	'+'

Error = 1.0

K = 7 | 7NN

point	Nearest Points (class)	Predicted class
1		'+' ✓
2		'+' ✗
3	(Computed	'+' ✓
4	using	'+' ✗
5	code)	'+' ✗
6		'o' ✗
7		'o' ✗
8		'o' ✓
9		'o' ✗
10		'o' ✓

$$\text{Error} = \frac{6}{10} = 0.6$$

K = 9 / 9NN

As total points are 10,
9NN simply predicts the majority class of the remaining 9 points (10 minus the point itself)

point	predicted class
1	o
2	+
3	o
4	+
5	+
6	o
7	o
8	+
9	o
10	+

All predicted wrong

Error = 1.0

∴ K = 7 leads to the minimum LOOCV validation error.

K = 1, 3, 5, 9 Error = 1.0

K = 7 Error = 0.6