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Set: 3M

Part 1)

validation set = $\{x_1\} = V_1$

training set = $\{x_2, x_3, x_4, x_5\} = T_1$

$KNN(x_1, T_1, 3) = 0$

$$d(x_1, x_2) = \sqrt{(2-1)^2 + (3-1)^2} = 2.24 \rightarrow 0 \checkmark$$

$$d(x_1, x_3) = \text{"} = 2.24 \rightarrow 0 \checkmark$$

$$d(x_1, x_4) = \sqrt{(3-1)^2 + (4-1)^2} = 3.61 \rightarrow 1 \checkmark$$

$$d(x_1, x_5) = \sqrt{(2-1)^2 + (5-1)^2} = 4.12$$

$$Err_{cv}^1 = 0$$

validation set = $\{x_2\} = V_2$

training set = $\{x_1, x_3, x_4, x_5\} = T_2$

$$d(x_2, x_1) = 2.24 \rightarrow 0 \checkmark$$

$$d(x_2, x_3) = 1.41 \rightarrow 0 \checkmark$$

$$d(x_2, x_4) = 2 \rightarrow 1 \checkmark$$

$$d(x_2, x_5) = 3.16 \rightarrow 1$$

$$KNN(x_2, T_2, 3) = 0$$

$$Err_{cv}^2 = 0$$

validation set = $\{x_3\} = V_3$

training set = $\{x_1, x_2, x_4, x_5\} = T_3$

$$d(x_3, x_1) = 4.12 \rightarrow 0$$

$$d(x_3, x_2) = 2 \rightarrow 0 \checkmark$$

$$d(x_3, x_4) = 3.16 \rightarrow 0 \checkmark$$

$$d(x_3, x_5) = 1.41 \rightarrow 1 \checkmark$$

$$KNN(x_3, T_3, 3) = 0$$

$$Err_{cv}^3 = 1$$

validation set = $\{x_4\} = V_4$

training set = $\{x_1, x_2, x_3, x_5\} = T_4$

$$d(x_4, x_1) = 3.61 \rightarrow 0$$

$$d(x_4, x_2) = 1.41 \rightarrow 0 \checkmark$$

$$d(x_4, x_3) = 2 \rightarrow 0 \checkmark$$

$$d(x_4, x_5) = 1.41 \rightarrow 1 \checkmark$$

$$KNN(x_4, T_4, 3) = 0$$

$$Err_{cv}^4 = 1$$

validation set = $\{x_5\} = V_5$

training set = $\{x_1, x_2, x_3, x_4\} = T_5$

$$d(x_5, x_1) = 4.12 \rightarrow 0$$

$$d(x_5, x_2) = 2 \rightarrow 0 \checkmark$$

$$d(x_5, x_3) = 3.16 \rightarrow 0 \checkmark$$

$$d(x_5, x_4) = 1.41 \rightarrow 1 \checkmark$$

$$KNN(x_5, T_5, 3) = 0$$

$$Err_{cv}^5 = 1$$

$$\Rightarrow Err_{cv} = \frac{3}{5} = \boxed{0.6}$$