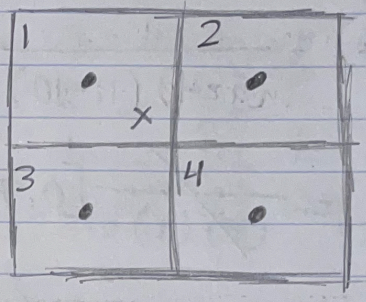
Homework #2 CSE-107

1. a) provide an estimate for P_5 using nearest neighbor interpolation

- $(x_1, y_1) = (4, 10)$ $P_1 = 100$
  $(x_2, y_2) = (4, 11)$ $P_2 = 107$
  $(x_3, y_3) = (5, 10)$ $P_3 = 120$
  $(x_4, y_4) = (5, 11)$ $P_4 = 130$
  $(x_5, y_5) = (4.3, 10.4)$ $P_5 = ?$...



$$* d_1 = \sqrt{(x_5 - x_1)^2 + (y_5 - y_1)^2}$$
$$= \sqrt{(4.3-4)^2 + (10.4-10)^2}$$
$$= \sqrt{(0.3)^2 + (0.4)^2}$$
$$= \sqrt{0.09 + 0.16}$$
$$= \sqrt{.25} = 0.5$$

$$* d_2 = \sqrt{(x_5 - x_2)^2 - (y_5 - y_2)^2}$$
$$= \sqrt{(4.3-4)^2 + (10.4-11)^2}$$
$$= \sqrt{(0.3)^2 + (-0.6)^2}$$
$$= \sqrt{0.09 + 0.36} = \sqrt{0.45} = .67$$

$$* d_3 = \sqrt{(x_5 - x_3)^2 + (y_5 - y_3)^2}$$
$$= \sqrt{(4.3-5)^2 + (10.4-10)^2}$$
$$= \sqrt{(-0.7)^2 + (0.4)^2}$$
$$= \sqrt{0.49 + 0.16} = \sqrt{0.65} = .80$$

$$* d_4 = \sqrt{(x_5 - x_4)^2 + (y_5 - y_4)^2}$$
$$= \sqrt{(4.3-5)^2 + (10.4-11)^2}$$
$$= \sqrt{(-0.7)^2 + (0.6)^2}$$
$$= \sqrt{(0.49) + (0.36)} = \sqrt{0.85} = .921$$

$P_5 = 100$

b) $x_1, y_1 = (4, 10)$ $P_1 = 100$ $x_1 = 4$
$x_1, y_2 = (4, 11)$ $P_2 = 107$ $x_2 = 5$
$x_2, y_1 = (5, 10)$ $P_3 = 120$ $y_1 = 10$
$x_2, y_2 = (5, 11)$ $P_4 = 130$ $y_2 = 11$

$$= \frac{1}{(x_2 - x_1)(y_2 - y_1)} (x_2 - x_5, x_5 - x_1) \begin{pmatrix} P_1 & P_2 \\ P_3 & P_4 \end{pmatrix} \begin{pmatrix} y_2 - y_5 \\ y_5 - y_1 \end{pmatrix}$$

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