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CS 355
Hw 9

1. $I[10,18] = 3 \quad I[10,19] = 4 \quad I[11,18] = 6 \quad I[11,19] = 8$

$[10.7, 18.2] =$

$f(x,y_1) = \frac{(11-10.7)}{11-10} \cdot 3 + \frac{(10.7-10)}{11-10} \cdot 6$

$f(x,y_2) = \frac{(11-10.7)}{11-10} \cdot 4 + \frac{(10.7-10)}{11-10} \cdot 8$

$f(x,y) = \frac{19-18.2}{19-18}(f(x,y_1)) + \frac{18.2-18}{19-18}(f(x,y_2)) = 5.44$

2. $(14,20), (15,11), (20,13), (18,23)$ $\quad Min(x) = 14 \quad Min(y) = 11$ $\quad Max(x) = 20 \quad Max(y) = 23$

corners = $(14,11), (20,23)$

3. $P = (17,16)$ using cross products $(p_{i+1} - p_i) \times (q - p_i)$

$$\begin{pmatrix} 15 \\ 11 \\ 0 \end{pmatrix} - \begin{pmatrix} 14 \\ 20 \\ 0 \end{pmatrix} \times \begin{pmatrix} 17 \\ 16 \\ 0 \end{pmatrix} - \begin{pmatrix} 14 \\ 20 \\ 0 \end{pmatrix} \rightarrow \begin{pmatrix} 1 \\ -9 \\ 0 \end{pmatrix} \times \begin{pmatrix} 3 \\ -4 \\ 0 \end{pmatrix} = 23$$

$$\begin{pmatrix} 20 \\ 13 \\ 0 \end{pmatrix} - \begin{pmatrix} 15 \\ 11 \\ 0 \end{pmatrix} \times \begin{pmatrix} 17 \\ 16 \\ 0 \end{pmatrix} - \begin{pmatrix} 15 \\ 11 \\ 0 \end{pmatrix} \rightarrow \begin{pmatrix} 5 \\ 2 \\ 0 \end{pmatrix} \times \begin{pmatrix} 2 \\ 4 \\ 0 \end{pmatrix} \rightarrow = 16$$

$$\begin{pmatrix} 18 \\ 23 \\ 0 \end{pmatrix} - \begin{pmatrix} 20 \\ 13 \\ 0 \end{pmatrix} \times \begin{pmatrix} 17 \\ 16 \\ 0 \end{pmatrix} - \begin{pmatrix} 20 \\ 13 \\ 0 \end{pmatrix} \rightarrow \begin{pmatrix} -2 \\ 10 \\ 0 \end{pmatrix} \times \begin{pmatrix} -3 \\ 3 \\ 0 \end{pmatrix} \rightarrow = 24$$

$$\begin{pmatrix} 14 \\ 20 \\ 0 \end{pmatrix} - \begin{pmatrix} 18 \\ 23 \\ 0 \end{pmatrix} \times \begin{pmatrix} 17 \\ 16 \\ 0 \end{pmatrix} - \begin{pmatrix} 18 \\ 23 \\ 0 \end{pmatrix} \rightarrow \begin{pmatrix} -4 \\ -3 \\ 0 \end{pmatrix} \times \begin{pmatrix} -1 \\ -7 \\ 0 \end{pmatrix} \rightarrow = 25$$

because all are positive, we know P is inside of the polygon