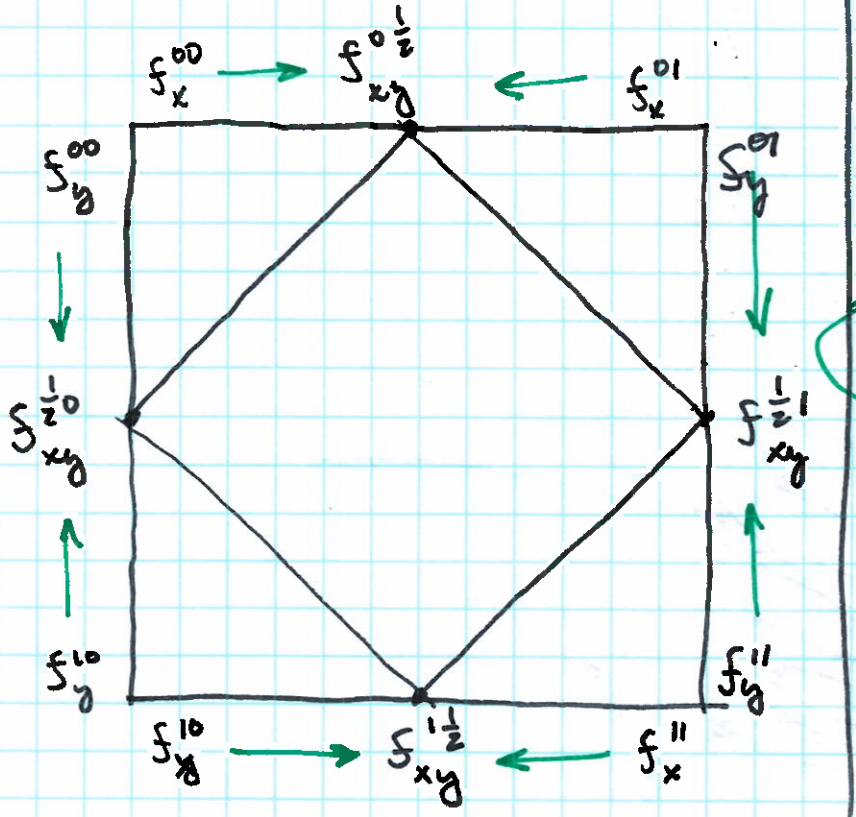
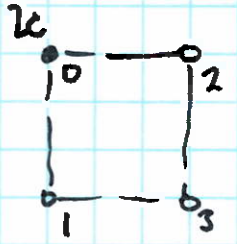


$$f_{xy}^{\frac{1}{2}0} = \frac{f_y^{10} - f_y^{00}}{h} + O(h^2)$$

$$f_{xy}^{0\frac{1}{2}} = \frac{f_x^{01} - f_x^{00}}{h} + O(h^2)$$

$$f_{xy}^{\frac{1}{2}1} = \frac{f_y^{11} - f_y^{01}}{h} + O(h^2)$$

$$f_{xy}^{1\frac{1}{2}} = \frac{f_x^{11} - f_x^{10}}{h} + O(h^2)$$



index

$f_y^0 = f_y^{00}$ $f_y^2 = f_y^{01}$

$f_y^1 = f_y^{10}$ $f_y^3 = f_y^{11}$

index

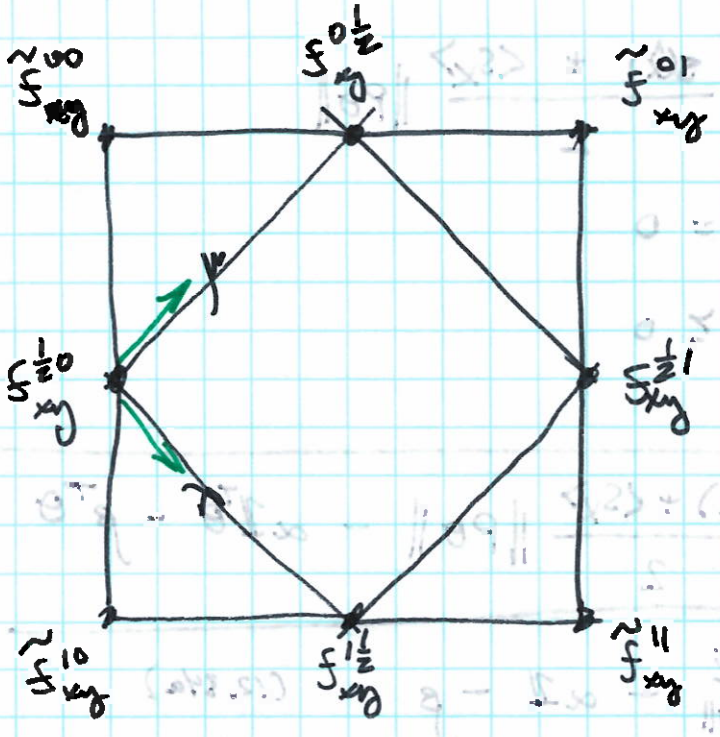
$f_x^0 = f_x^{00}$ $f_x^2 = f_x^{01}$

$f_x^1 = f_x^{10}$ $f_x^3 = f_x^{11}$

approximate

$f_{xy}^0 = f_{xy}^{\frac{1}{2}0}$ $f_{xy}^2 = f_{xy}^{0\frac{1}{2}}$

$f_{xy}^1 = f_{xy}^{1\frac{1}{2}}$ $f_{xy}^3 = f_{xy}^{1\frac{1}{2}}$



$$\tilde{f}_{xy}(\lambda,\mu) = (1-\lambda)\left[(1-\mu) f^{\frac{1}{2}0}_{xy} + \mu f^{0\frac{1}{2}}_{xy}\right] + \lambda\left[(1-\mu) f^{1\frac{1}{2}}_{xy} + \mu f^{\frac{1}{2}1}_{xy}\right]$$

$$\tilde{f}^{00}_{xy} = \tilde{f}_{xy}\left(\tfrac{1}{2},\tfrac{1}{2}\right) = \tfrac{3}{4} f^{\frac{1}{2}0}_{xy} + \tfrac{1}{4} f^{1\frac{1}{2}}_{xy} + \tfrac{3}{4} f^{0\frac{1}{2}}_{xy} - \tfrac{1}{4} f^{\frac{1}{2}1}_{xy}$$

$$\tilde{f}^{10}_{xy} = \tilde{f}_{xy}\left(\tfrac{1}{2},-\tfrac{1}{2}\right) = \tfrac{3}{4} f^{\frac{1}{2}0}_{xy} + \tfrac{3}{4} f^{1\frac{1}{2}}_{xy} - \tfrac{1}{4} f^{0\frac{1}{2}}_{xy} - \tfrac{1}{4} f^{\frac{1}{2}1}_{xy}$$

$$\tilde{f}^{01}_{xy} = \tilde{f}_{xy}\left(\tfrac{1}{2},\tfrac{3}{2}\right) = -\tfrac{1}{4} f^{\frac{1}{2}0}_{xy} - \tfrac{1}{4} f^{1\frac{1}{2}}_{xy} + \tfrac{3}{4} f^{0\frac{1}{2}}_{xy} + \tfrac{3}{4} f^{\frac{1}{2}1}_{xy}$$

$$\tilde{f}^{11}_{xy} = \tilde{f}_{xy}\left(\tfrac{3}{2},\tfrac{1}{2}\right) = -\tfrac{1}{4} f^{\frac{1}{2}0}_{xy} + \tfrac{3}{4} f^{1\frac{1}{2}}_{xy} - \tfrac{1}{4} f^{0\frac{1}{2}}_{xy} + \tfrac{3}{4} f^{\frac{1}{2}1}_{xy}$$

$$\Rightarrow \begin{bmatrix} \tilde{f}^{00}_{xy} \\ \tilde{f}^{10}_{xy} \\ \tilde{f}^{01}_{xy} \\ \tilde{f}^{11}_{xy} \end{bmatrix} = \begin{bmatrix} \frac{3}{4} & -\frac{1}{4} & \frac{3}{4} & -\frac{1}{4} \\ \frac{3}{4} & \frac{3}{4} & -\frac{1}{4} & -\frac{1}{4} \\ -\frac{1}{4} & -\frac{1}{4} & \frac{3}{4} & \frac{3}{4} \\ -\frac{1}{4} & \frac{3}{4} & -\frac{1}{4} & \frac{3}{4} \end{bmatrix} \begin{bmatrix} f^{\frac{1}{2}0}_{xy} \\ f^{1\frac{1}{2}}_{xy} \\ f^{0\frac{1}{2}}_{xy} \\ f^{\frac{1}{2}1}_{xy} \end{bmatrix}$$

$$\begin{bmatrix} f^{\frac{1}{2}0}_{xy} \\ f^{1\frac{1}{2}}_{xy} \\ f^{0\frac{1}{2}}_{xy} \\ f^{\frac{1}{2}1}_{xy} \end{bmatrix} = \frac{1}{4} \left[\begin{array}{cccc|cccc} 0 & 0 & 0 & 0 & -1 & +1 & 0 & 0 \\ 0 & 0 & -1 & +1 & 0 & 0 & 0 & 0 \\ -1 & +1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -1 & +1 \end{array}\right] \begin{bmatrix} f^{00}_{xy} \\ f^{10}_{xy} \\ f^{01}_{xy} \\ f^{11}_{xy} \\ f^{00}_{xy} \\ f^{10}_{xy} \\ f^{01}_{xy} \\ f^{11}_{xy} \end{bmatrix}$$