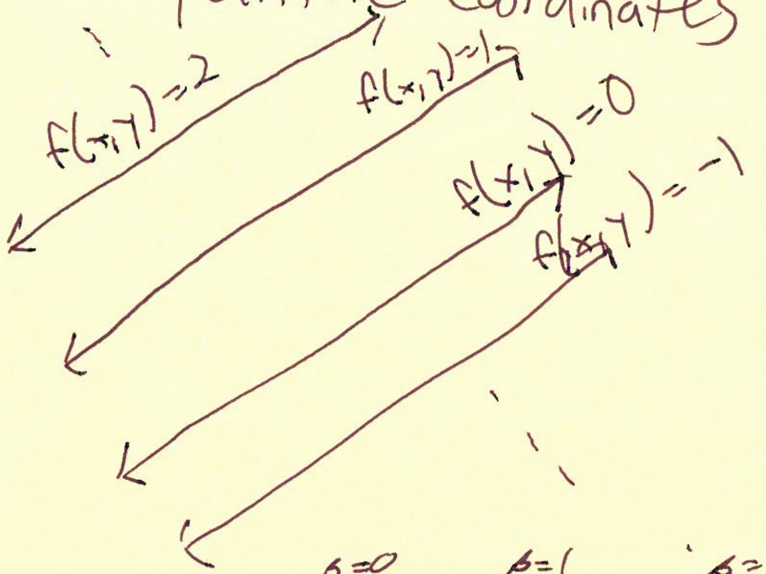
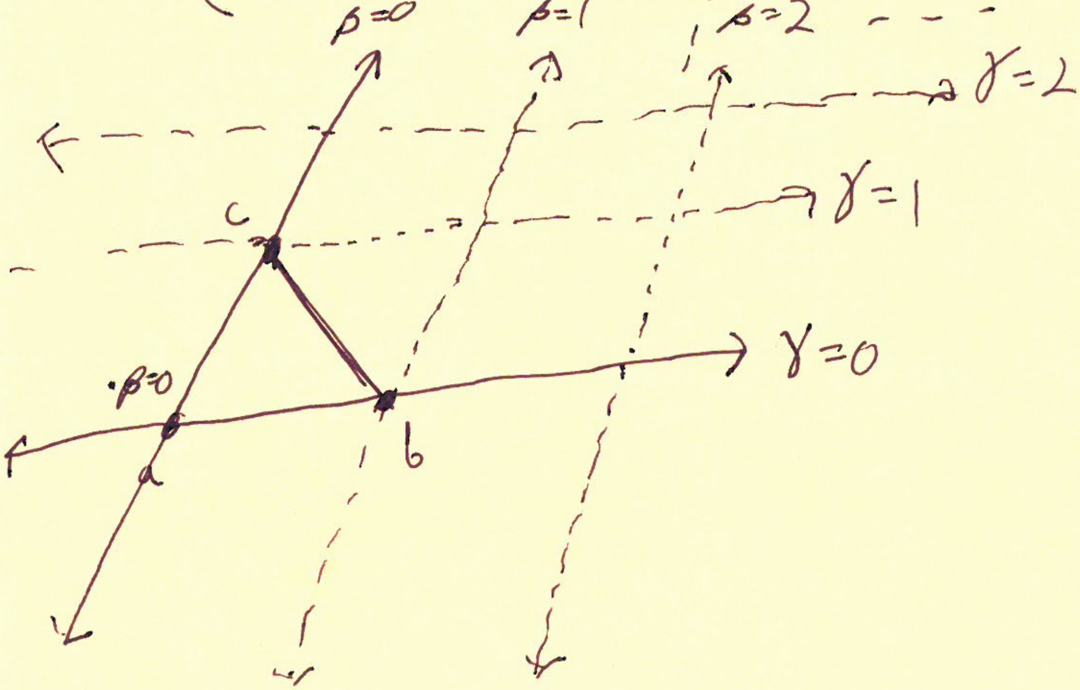
Barycentric Coordinates

23 Jan



$$f(x,y) = Ax + By + C$$

$$f(x,y) = Ax + By + C + 1$$



$$p = a + \beta(b-a) + \gamma(c-a)$$

rewrite as

$$p = (1-\beta-\gamma)a + \beta(b-a) + \gamma(c-a)$$

$$= \cancel{(1-\beta-\gamma)a + \beta v_1 + \gamma v_2} = (1-\beta-\gamma)a + \beta b + \gamma c$$

$$= \cancel{\alpha a + \beta b + \gamma c} \quad \text{w/ } \alpha + \beta + \gamma = 1$$

$$= \alpha a + \beta b + \gamma c$$

Why is this useful?

a point is in Δ if

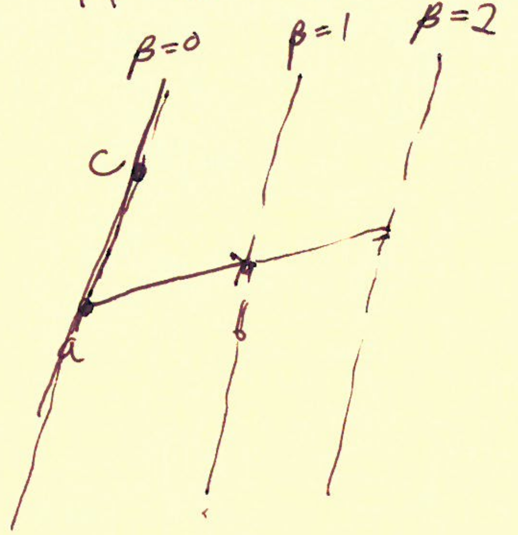
$0 < \alpha < 1$

$0 < \beta < 1$

$0 < \gamma < 1$

if value is 1 — on vertex e.g $\alpha = 1, \beta = 0, \gamma = 0$

if 1 value is 0 e.g $\alpha = .5, \beta = .5, \gamma = 0$



$f_{ac}(x, y) = 0$ is the line through ac

$$\beta = \frac{f_{ac}(x, y)}{f_{ac}(b_x, b_y)}$$

$$\gamma = \frac{f_{ab}(x, y)}{f_{ab}(c_x, c_y)}$$ w/ f_{ab} as standard form line through AB

$$\alpha = 1 - \beta - \gamma$$