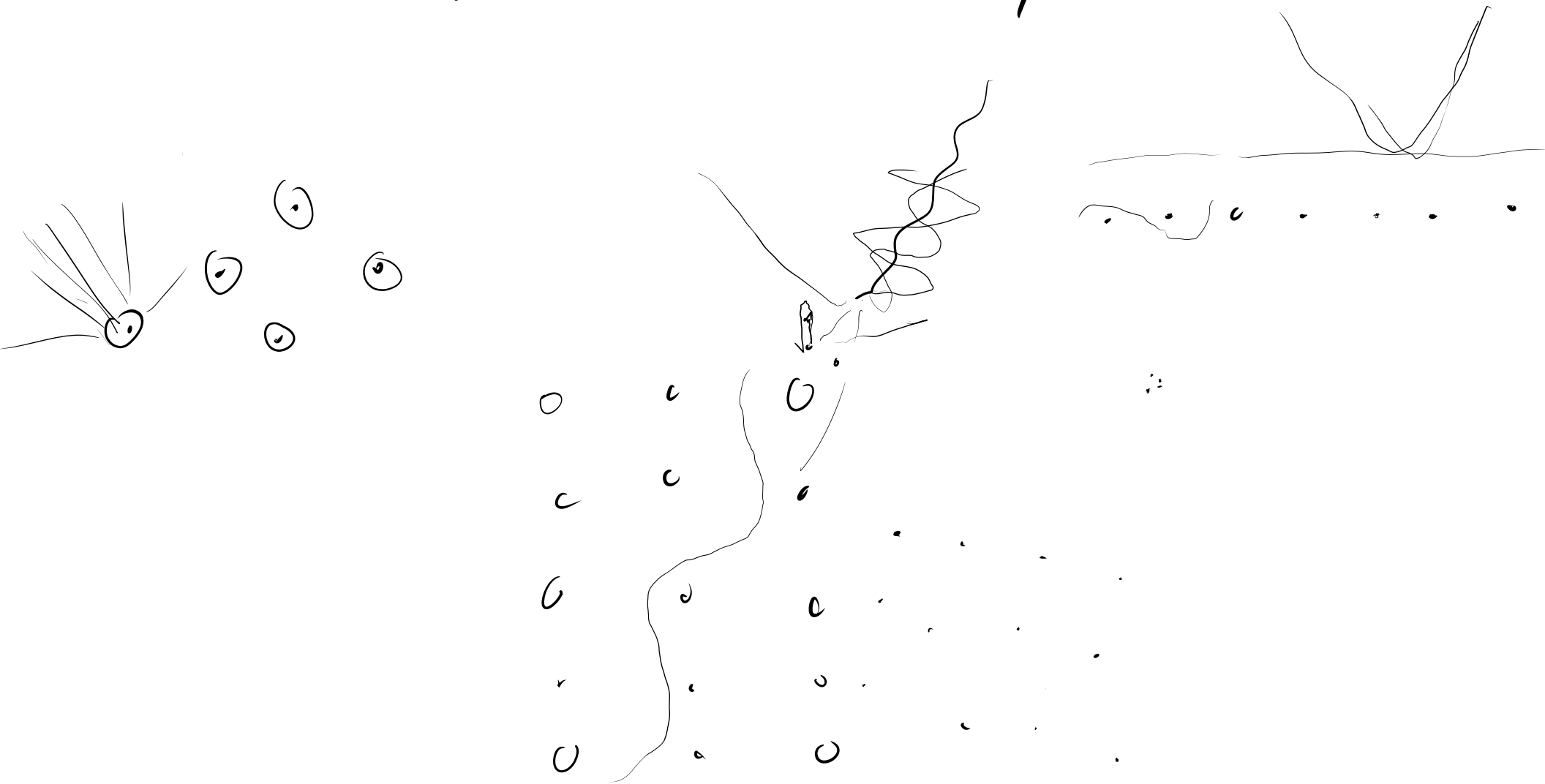
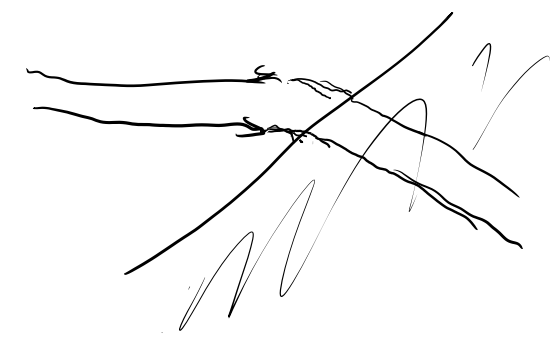
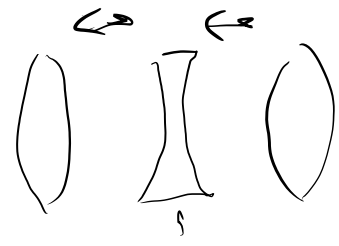
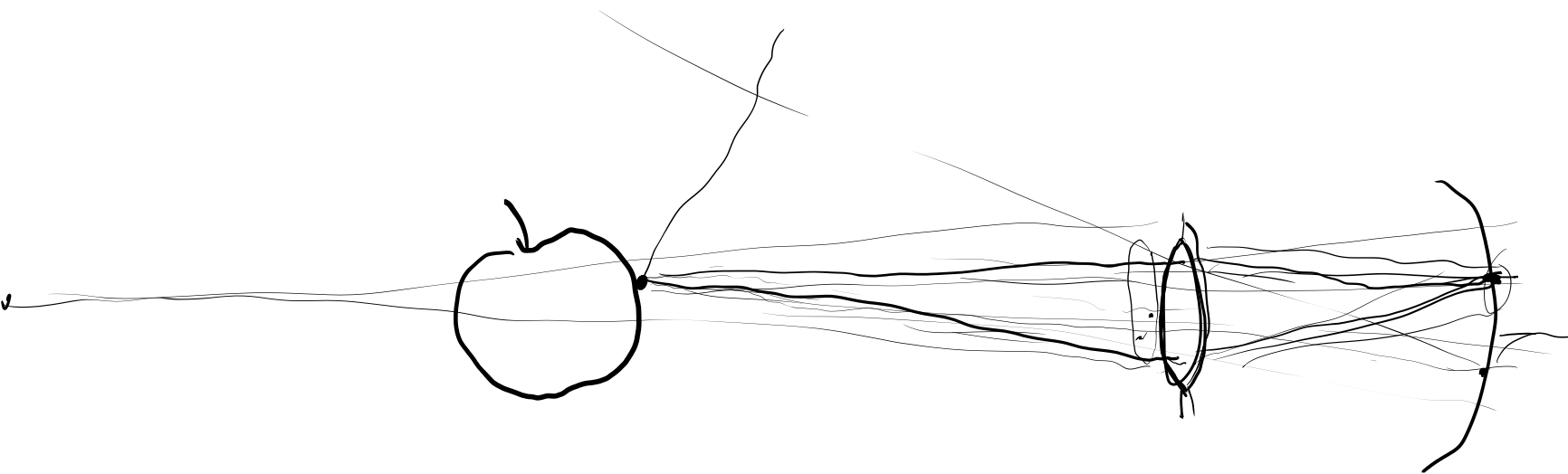


Why is metal shiny





Bezier

B-spline

Non-uniform

rational

NURBS

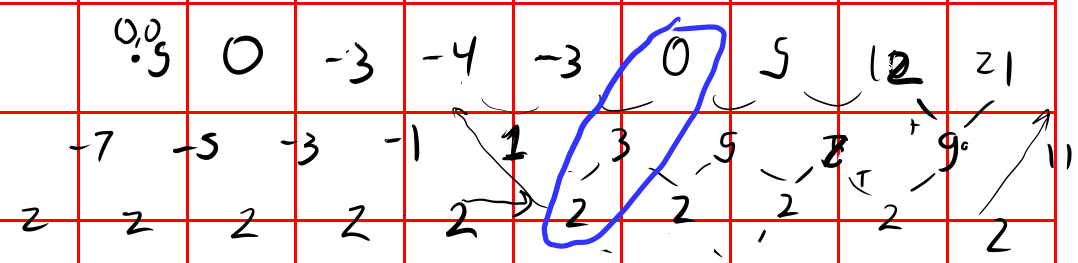
subdivision

finite differences

Circles

$$\rightarrow (x-3)^2 + y^2 - 2^2 = 0$$

3,0	→	-4
4,0	→	-3
5,0	→	0
6,0	→	5
7,0	→	12



$$f(s,0) = 0$$

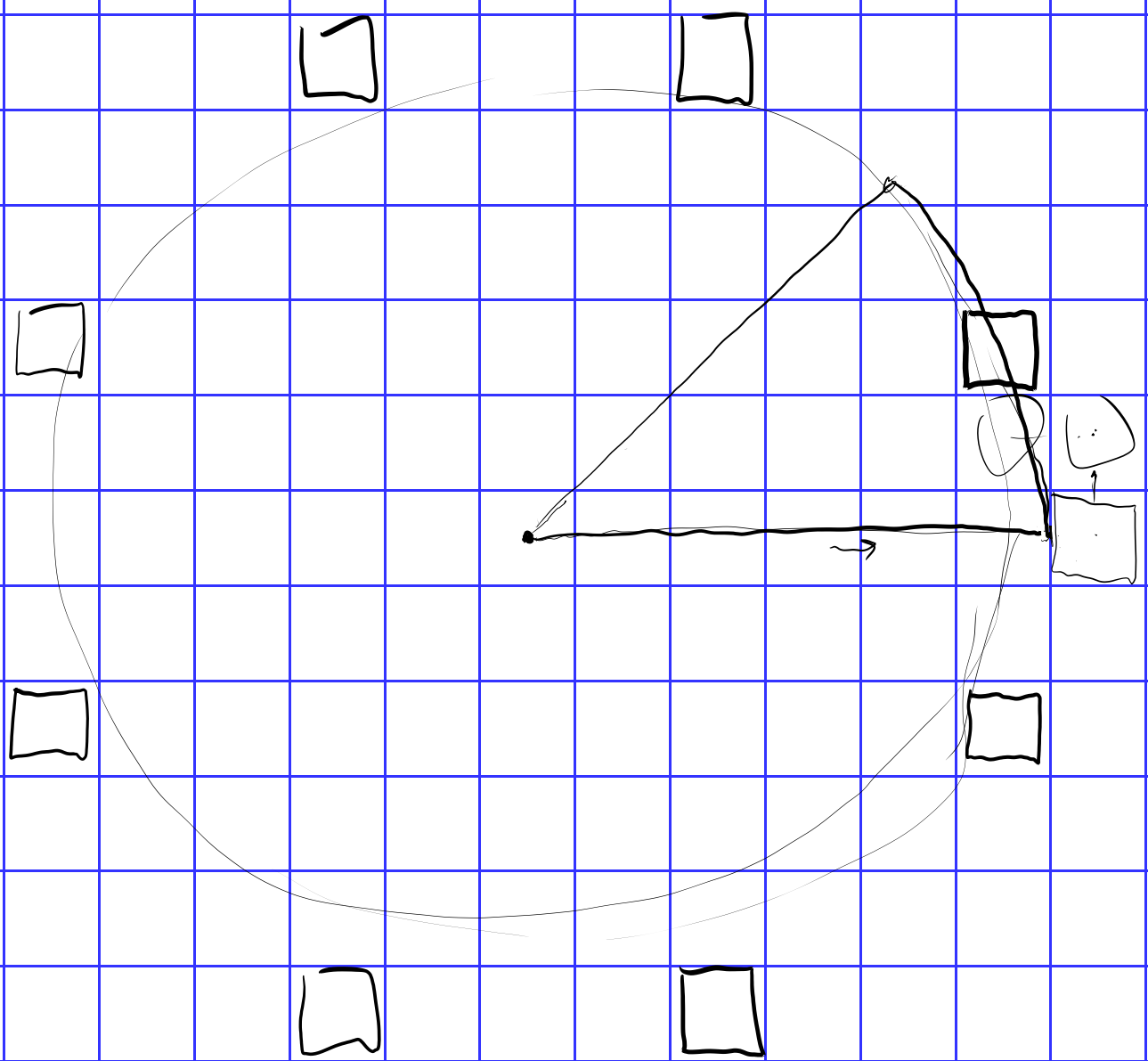
$$f_x(s,0) = 3$$

$$f_{xx} = 2$$

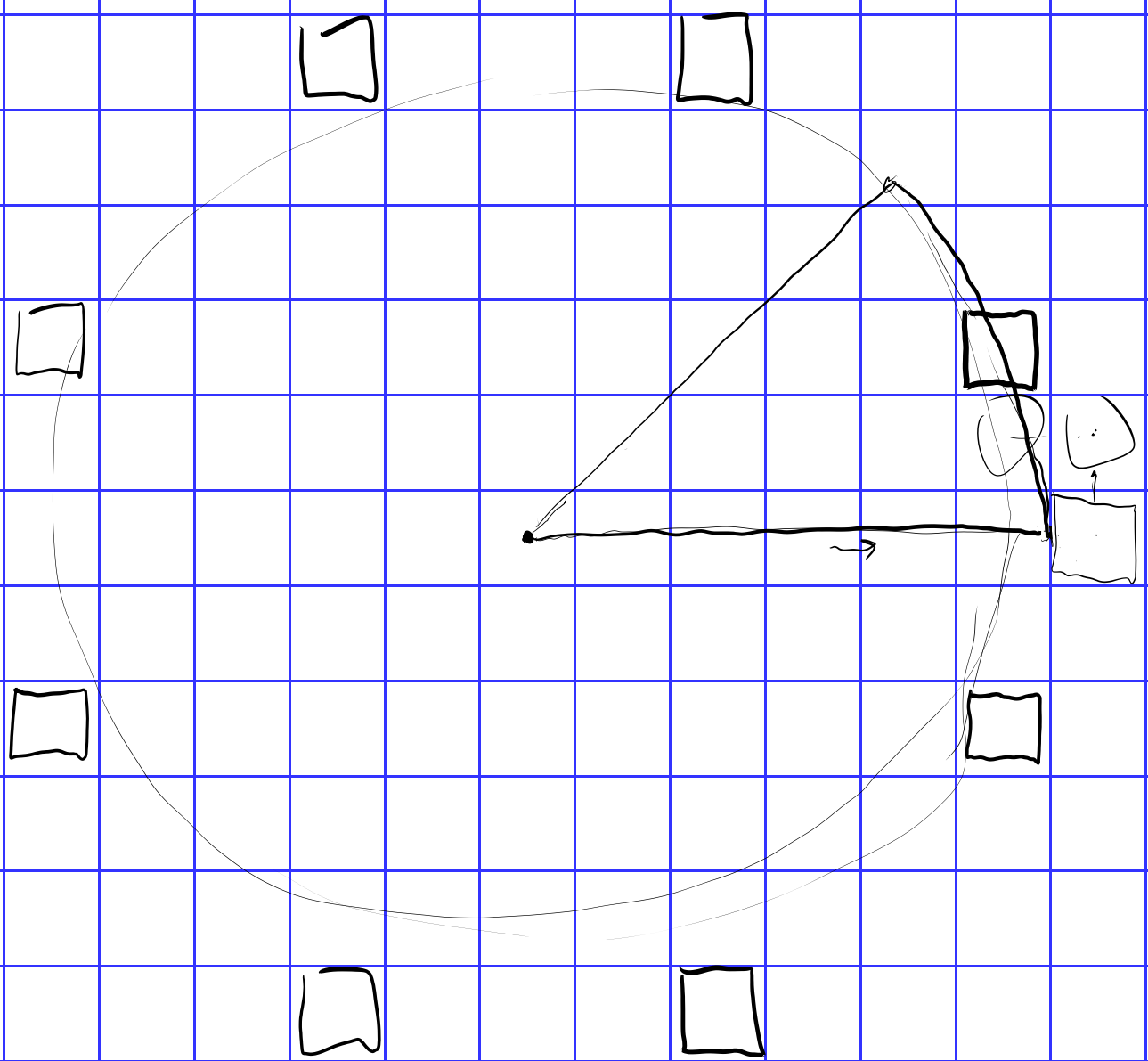
$$f_y(s,0) = -$$

$$f_{xy} = 2$$

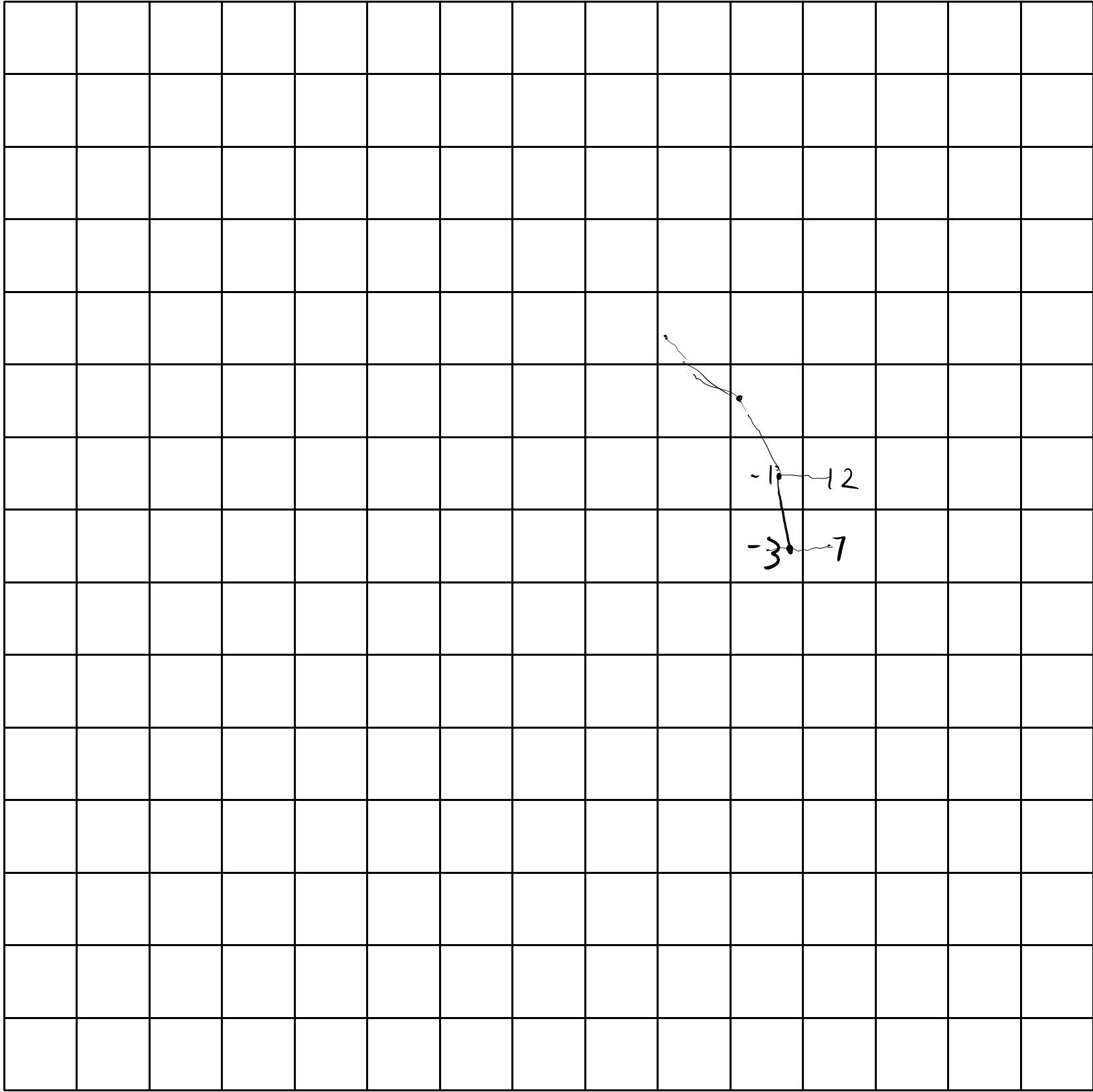
32 45
13
2



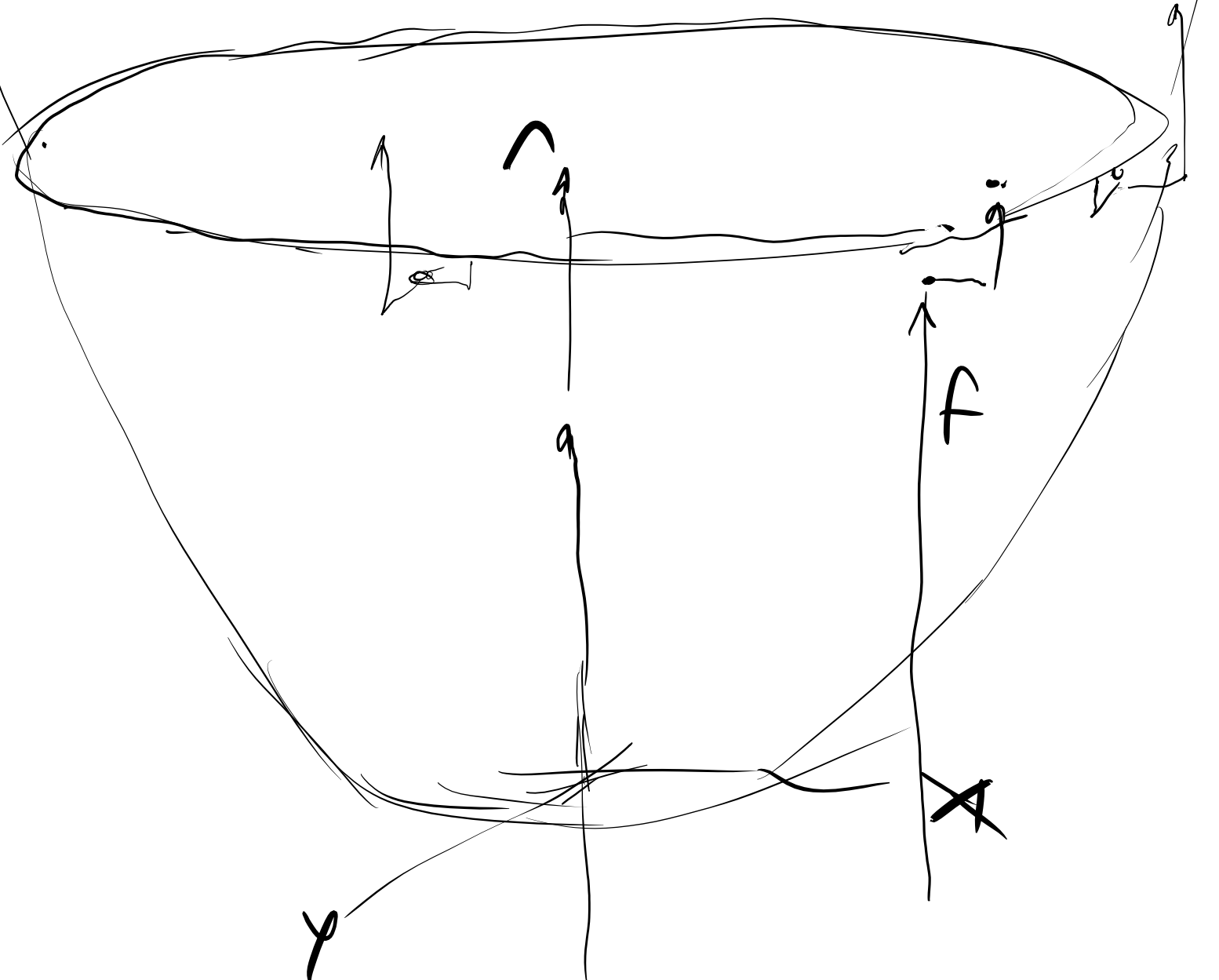
UP
 $f += f_y$
 $f_y += f_{yy}$
 $if (f > 0) \{$
 $\rightarrow f_x -= f_{xx}$
 $f -= f_x$
 $x += 1$
 $\}$
 $f(p) =$
 $f_x =$
 $f_y =$
 $f_{xx} = 2$
 $f_{yy} = 2$



UP
 $f_t = f_y$
 $f_{y,t} = f_{y,y}$
 if $(f > 0)$ {
 $f_x = f_{x,x}$
 $f = f_x$ $x + 1$
 $f(p) =$
 $f_x =$
 $f_y =$
 $f_{xx} = 2$
 $f_{yy} = 2$

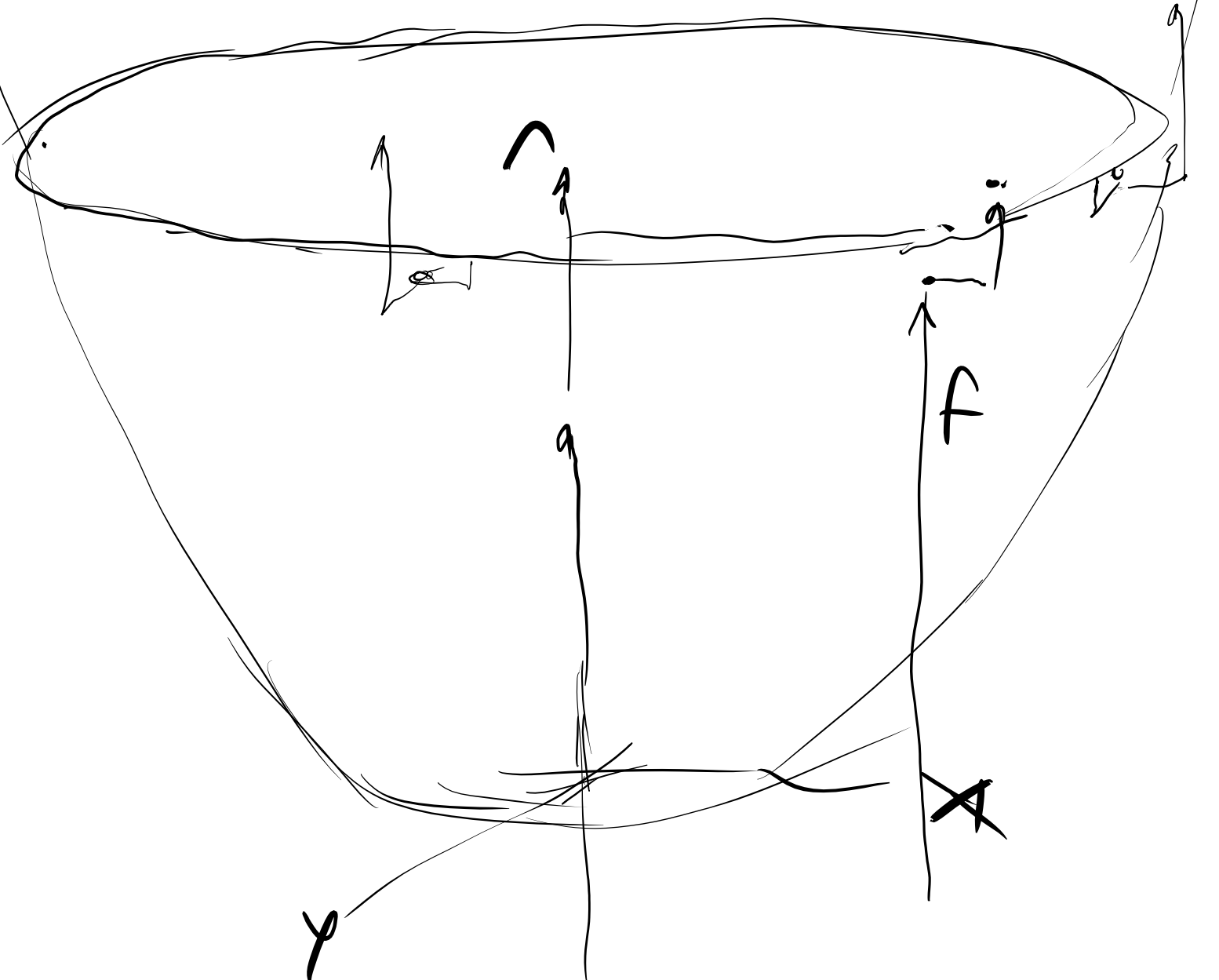


$$x^2 + y^2 = r^2$$



F_x
 F_y
 F_{xx}
 F_{yy}

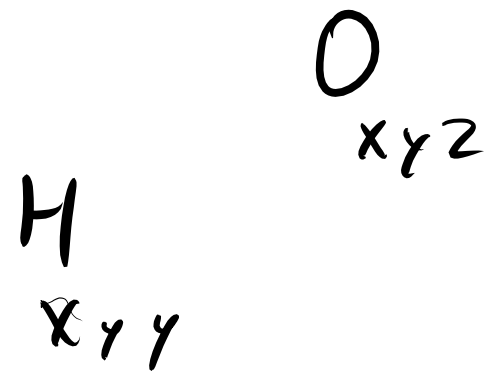
$$x^2 + y^2 = r^2$$



- F_x
- F_y
- F_{xx}
- F_{yy}

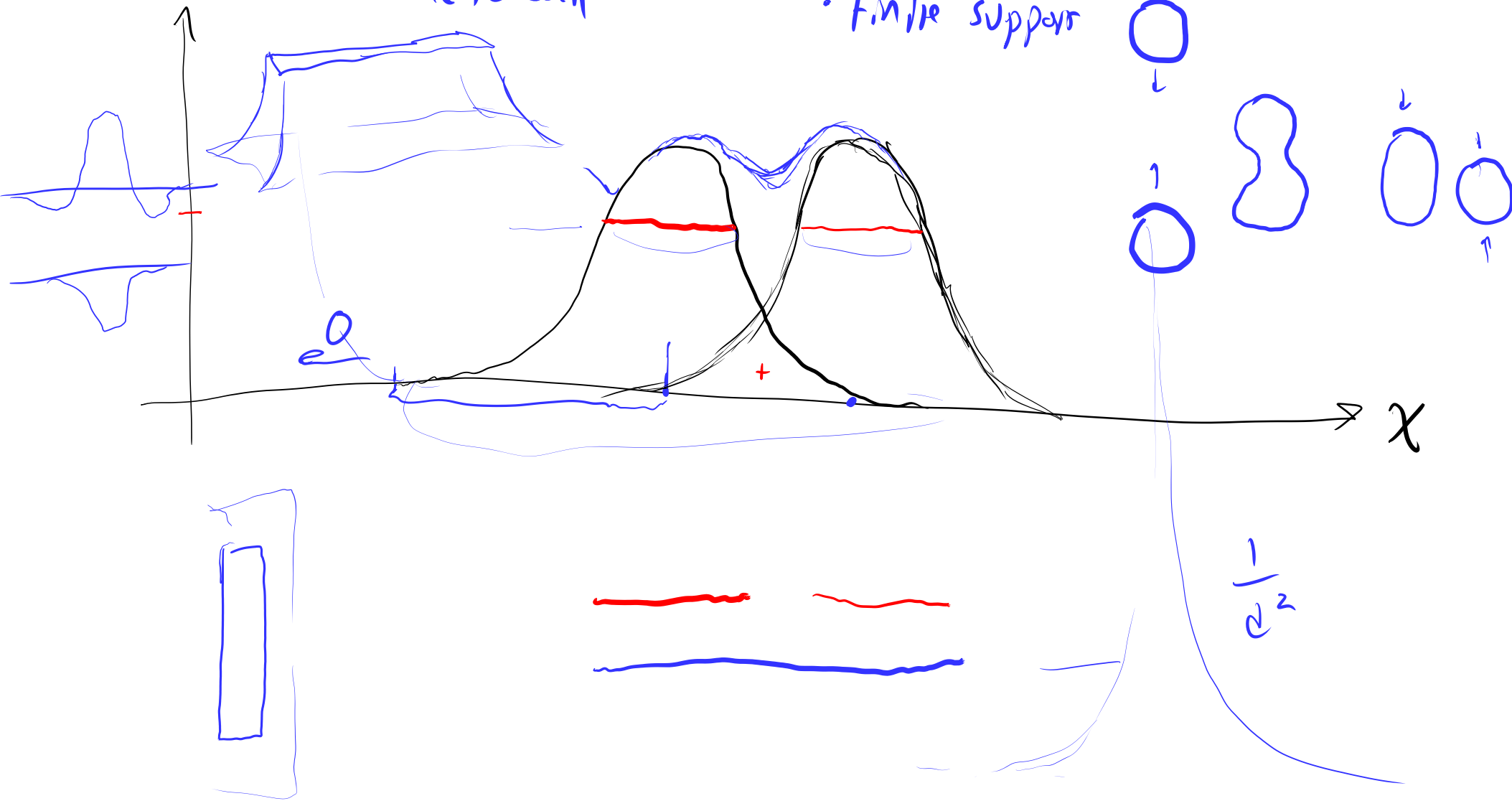
Blobbies

Molecules



Metaball

- smooth
- finite support



e^{-x^2}

$$\frac{C_b \cdot \alpha_b (1 - \alpha_a) + C_A \cdot \alpha_a}{1 - (1 - \alpha_a)(1 - \alpha_b)}$$

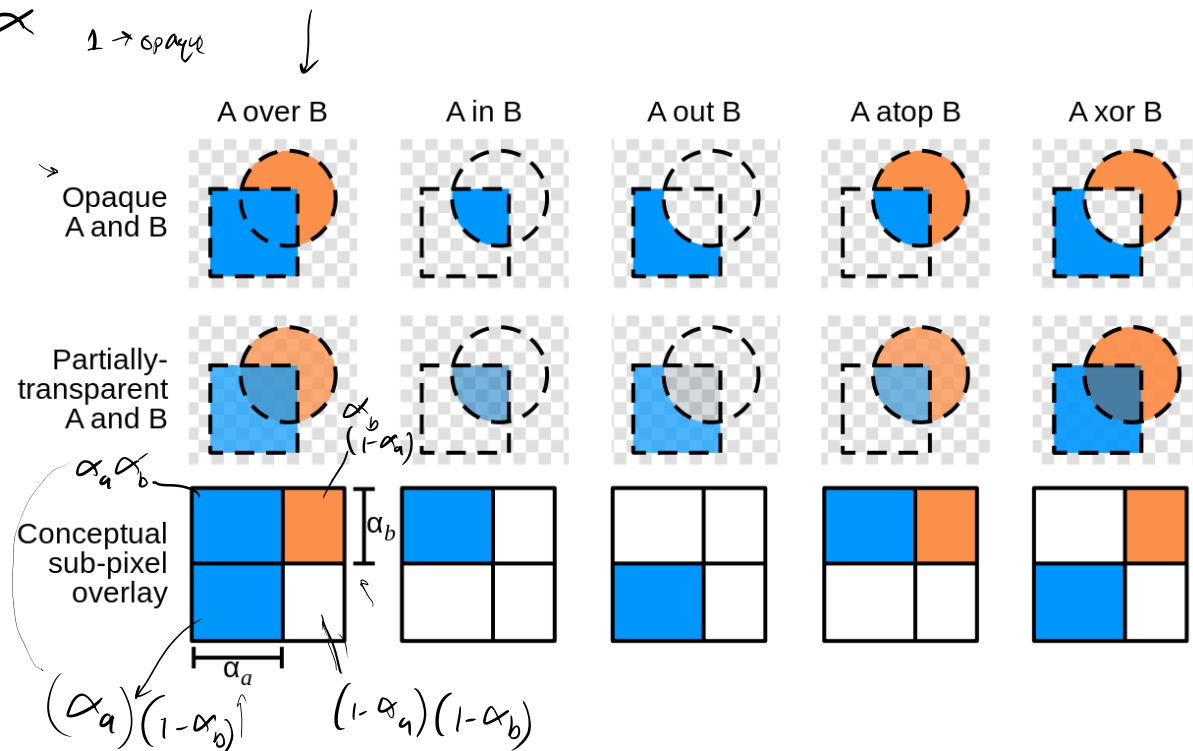
$$C_A \cdot \alpha_a$$

$$C_A \cdot (\alpha_a \cdot (\alpha_b + 1 - \alpha_b))$$

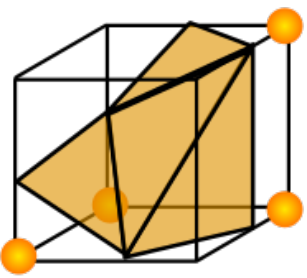
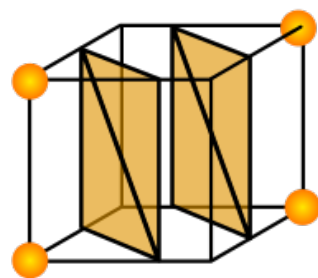
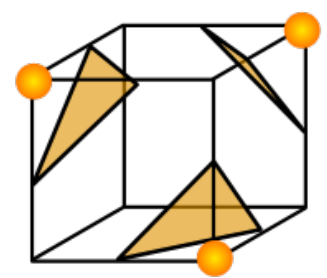
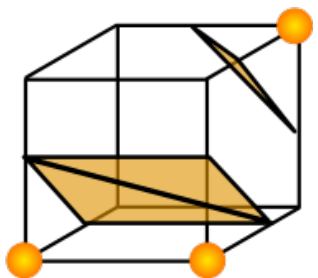
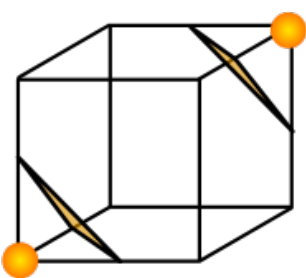
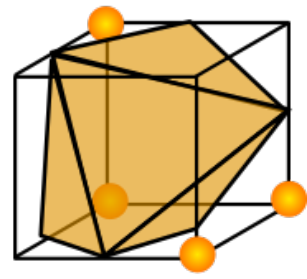
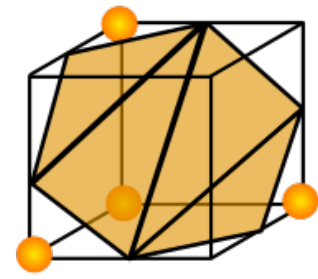
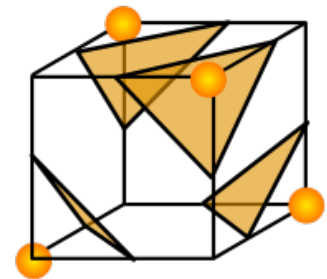
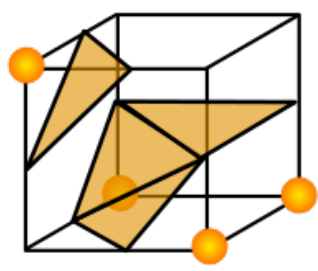
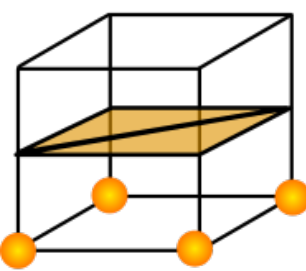
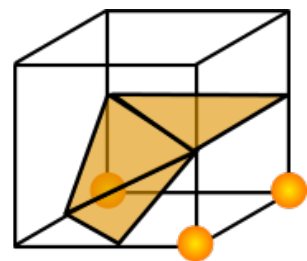
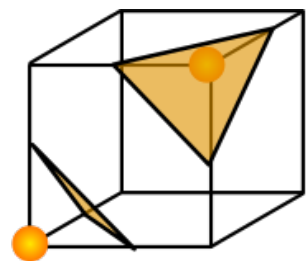
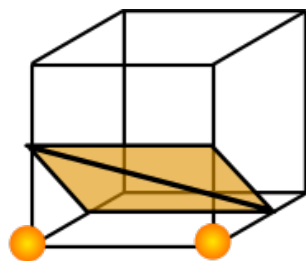
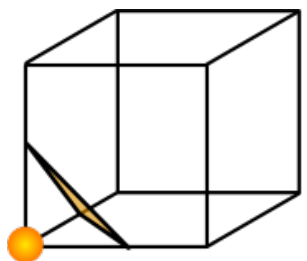
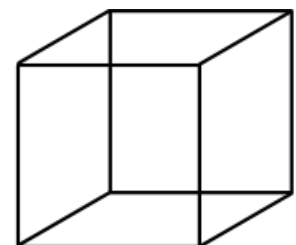
pre-multiplied Color + $C_B \alpha_b (1 - \alpha_a)$

$$\alpha = 1 - (1 - \alpha_A)(1 - \alpha_B)$$

α
 $0 \rightarrow$ Trans
 $1 \rightarrow$ opaque



Marching Cubes



Bezier^{CP} → N ~~A~~ B

Subdiv — low-res

blobbles — particles / balls

a whole lot of tiny polygons



