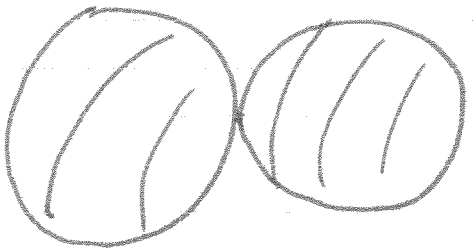
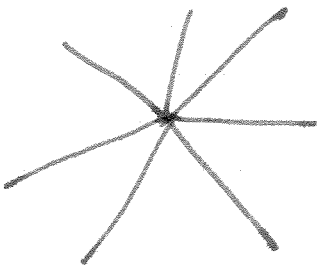
(1) What is the Euler characteristic of

(a) two spheres touching in one point



for instance given as the zero set of

$$(x^2+y^2+z^2-1)((x-1)^2+y^2+z^2-1) = 0$$

(b) 

7 closed intervals with the start point in common

for instance the set of $re^{i\theta} \in \mathbb{C}$ with $0 \le r \le 1$, $\theta = 0$ or $\frac{2\pi}{7}$ or ... or $\frac{6\cdot 2\pi}{7}$

(c) the curve $x^3y + y^3z + z^3x = 0$ in $\mathbb{P}^2$ (this is a famous curve - the Klein quartic)

②(a) What are the singular points in $\mathbb{C}^2$ of $y^2 = x^2(x-1)^3$?

(b) What is the homogenization of $y^2 = x^2(x-1)^3$?

③ What are the singular points in $\mathbb{P}^2$ of

a) $x^3y + y^3z + z^3x = 0$?

b) of $y^2z^3 = x^3(x-z)^2$

④ How many automorphisms can you find of

a) $x^4 + y^4 + z^4 = 0$?

and

b) $x^3y + y^3z + z^3x = 0$?