1. Suppose that F is an algebraic plane curve and $P \in F$. Show that:

$$\mu_P(F, x - x(P)) = \mu_P(F, \frac{\partial F}{\partial y}) + 1$$

2. What is the correct form of Bézout's theorem for curves in $\mathbf{P}^1 \times \mathbf{P}^1$?

3. Prove this generalization of the structure theorem for artinian rings:

   Theorem 1. *If A is a commutative ring in which all primes are maximal and there are only finitely many of them, $A \simeq \prod_P A_P$. (The product is taken over all prime ideals of A and A_P is the localization of A at P.)*

4. Suppose K is a field. Prove that every automorphism of $K(t)$ is a Möbius transformation: $f(t) = \frac{at+b}{ct+d}$ with $a, b, c, d \in K$ and $ad - bc \neq 0$.

5. Determine all valuations of $K(t)$ when K is a field.

6. If $f : K(t) \to K(t)$ is a Möbius transformation, it permutes the valuations of $K(t)$. How many valuations can be fixed by f?