1. Find horizontal and vertical tangent lines of $x \ln x = y^3 - xy$

2. Find vertical tangent line to $x^2 \ln xy = xy^2$

3. Find vertical tangent line of $x \ln y^2 = x^2 y^2$

4. Find horizontal tangent lines of $x^2 y - y^2 = 3xy^3$

5. A particle moves according to the position equation $x(t) = \tan(\sin e^{2t})$ for $t \geq 0$. Find the velocity and the acceleration at the first time it is at the origin.

6. A particle moves according to the position equation $x(t) = \sin\left(2^{\frac{x}{2}}\right)$ for $t \geq 0$. Find the acceleration of the particle at the first time its velocity is zero.