1. ODE, second order, nonlinear; x is independent variable, y is dependent variable.

2. Because $\phi'(x) = 6x$, the expression in the left-hand can be written as $x \cdot 6x$. The expression in the right-hand side can be written as $3 \cdot 6x$. The two expressions are equal.

3. We can rewrite the ODE as $\frac{dy}{dx} = x^2/y$. The expression in the right-hand side is not continuous at $y = 0$. Therefore the I.V.P. doesn't have a unique solution.