Homework 2

Problem 1

Which of the two equations

\[
\frac{dy}{dx} + y^2 \sin x = 0
\]

\[
(1 + x) \frac{dy}{dx} + y = \cos x
\]

is linear? Solve that one (ignore the other one), with initial condition \(y(0) = 1\).

Problem 2

Find the solution of

\[
\frac{dy}{dx} = y^2(1 - 2x) \quad , \quad y(0) = -\frac{1}{2}
\]

Find the largest \(x\) interval containing 0 on which \(y\) is well-defined. Sketch the graph of \(y\) over that interval.