$y' = 2y^{\frac{1}{2}} + 2y \quad | : y^{\frac{1}{2}}$ Bernoulli equation

$$\frac{y'}{y^{\frac{1}{2}}} = 2 + 2y^{\frac{1}{2}}$$

Substitution: $z = y^{\frac{1}{2}}$; $z' = \frac{1}{2} y^{-\frac{1}{2}} y'$

$z' = z + 1$

$z' - z = 0$

$\ln z = x + c$

$z = e^{x} \cdot c(x)$

$e^{x} c'(x) + e^{x} c(x) - e^{x} c(x) = 1$

$e^{x} c'(x) = 1$

$c(x) = -e^{-x} + c$

$z = -1 + ce^{x}$

$y = (-1 + ce^{x})^2$

$y(0) = 1$; $1 = (-1 + c)^2$

$$\left[\begin{array}{l} c = 2 \\ c = 0 - \text{trivial solution} \end{array}\right.$$

IVP Solution:

$\underline{y = (1 - 2e^{x})^2}$