(1) Find the general solution to \[ \frac{dy}{dx} = 3x^2e^{-y} \] and then the specific solution when \( y(0) = 1 \).

(2) Solve the differential equation \( y' = \frac{y}{x} \).

(3) Find the general solution to \( y' = \frac{-x}{y} \).

(4) Solve the initial value problem \[ \frac{dy}{dx} = e^{2x+y}, \quad y(0) = 0. \]

(5) Find the general solution to \[ x\frac{dy}{dx} = y^2 + 1 \] and then the specific solution when \( y(1) = 1 \).

(6) Solve the differential equation \[ \frac{xy}{x+1} = \frac{dy}{dx}. \]

(7) Solve the differential equation \[ \frac{1}{y}\frac{dy}{dx} = \frac{x}{x^2 + 1}. \]

(8) (*Challenge*) Solve the differential equation \( x\frac{dy}{dx} = y^2 - 1. \)

   Hint: Log rules will be helpful here when trying to exactly solve for \( y \).

---

*Solutions to be posted on the Schedule and Homework pages of the website by the end of the day*