1. Match up the differential equation with the graph of its slopefield.

(a) $y' = y - t$ \hspace{1cm} \text{Solution: I}
(b) $y' = (y - 1)t$ \hspace{1cm} \text{Solution: D}
(c) $y' = (y + 1)(t - 1)$ \hspace{1cm} \text{Solution: G}
(d) $y' = -yt$ \hspace{1cm} \text{Solution: H}
(e) $y' = y(t - 1)$ \hspace{1cm} \text{Solution: B}
(f) $y' = y(t + 1)$ \hspace{1cm} \text{Solution: C}
(g) $y' = (y + 1)(t + 1)$ \hspace{1cm} \text{Solution: F}
(h) $y' = (y + 1)t$ \hspace{1cm} \text{Solution: E}
(i) $y' = yt$ \hspace{1cm} \text{Solution: A}
Lecture Problems

2. Find the general and particular solutions to the differential equations.

(a) \[ y' = \frac{2t}{y^2} \quad y(1) = 2 \]
Solution:
\[ y = (3t^2 + C)^{1/3} \quad y = (3t^2 + 5)^{1/3} \]

(b) \[ \frac{dx}{dt} = x^2 \ln t \quad x(1) = -2 \]
Solution:
\[ \frac{1}{x} = t \ln t - t + C \quad -\frac{1}{x} = t \ln t - t + \frac{3}{2} \]
\[ x = -\frac{1}{t \ln t - t + C} \]

(c) \[ y' = \frac{x}{y} \quad y(0) = 2 \]
Solution:
\[ y^2 = x^2 + C \quad y = \sqrt{x^2 + 4} \]

(d) \[ y' = \frac{x}{y} \quad y(0) = -2 \]
Solution:
\[ y^2 = x^2 + C \quad y = -\sqrt{x^2 + 4} \]

(e) \[ y' = xe^{x-y} \quad y(0) = 0 \]
Solution:
\[ e^y = (x - 1)e^x + C \quad y = \ln ((t - 1)e^t + 2) \]

(f) \[ \frac{dP}{du} = \frac{P}{u} \quad P(1) = 5 \]
Solution:
\[ P = Ct \quad P = 5t \]