1. Solve the initial-value problem \( \frac{dy}{dt} = te^{-y} \) where \( y(1) = 0 \).

\[
\frac{dy}{dt} = te^{-y} \Rightarrow \int \frac{dy}{e^{-y}} = \int te^t \, dt = \int e^y \, dy
\]

So, \( e^y = \frac{1}{2} t^2 + C \)

\[
y = \ln\left| \frac{1}{2} t^2 + C \right|
\]

General solution

0 = y(1) = ln\left| \frac{1}{2} + C \right|

\[
e^0 = \frac{1}{2} + C = 1 \Rightarrow C = \frac{1}{2}
\]

\[
y = \ln\left| \frac{1}{2} t^2 + \frac{1}{2} \right|
\]

Particular solution

2. Identify which of the following slope fields corresponds to the above differential equation, and provide justification for your choice.

Slope Field I

Slope Field II

\[
\frac{dy}{dt} = te^{-y} \quad \text{if } t=0, \quad \frac{dy}{dt} = 0
\]

So a \(t=0\)-isocline is \(t=0\) (y-axis)

3. Sketch your particular solution to part (a) on your chosen slope field from part (b).