

Show all work, including mental steps, in a clearly organized way that speaks for itself. Use proper mathematical notation, identifying expressions by their proper symbols (introducing them if necessary), and use equal signs and arrows when appropriate. Always simplify expressions. BOX final short answers. LABEL parts of problem. Keep answers EXACT (but give decimal approximations for interpretation). Indicate where technology is used and what type (Maple, GC).

1.  $y' = e^{-y}$  : *gen sol* :  $y(x) = \ln(x + C)$

- Verify that this  $y$  satisfies the given differential equation.
- Find the solution which satisfies the initial condition  $y(0) = 0$ .

Organize your work as though you were playing professor.

2. Choose appropriately named variables and write a differential equation that models the situation:

"When sugar is dissolved in water the time rate of change of the amount that remains undissolved in water is proportional to that amount."

Knowing that this amount should decrease, what is the sign of the constant of proportionality you introduced?

## ► solution