MAT2705-01/02 12f Quiz 1   Print Name (Last, First) _____ , _____|_____
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 arrows and equal signs 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. $x\dfrac{dy}{dx} + 3y = 2x^5$, $gen\ soln:\ y = \dfrac{1}{4}x^5 + Cx^{-3}$

   a) Verify that this y satisfies the given differential equation.
   b) Find the solution which satisfies the initial condition $y(1) = 2$.
Organize your work as though you were playing professor.

2. Choose appropriately named variables and write a differential equation that models the situation:
"A spherical balloon is being blown up inside a spherical cavity of volume V_S filled with liquid in such a
way that the time rate of change of the balloon's volume is inversely proportional to the balloon's volume
and directly proportional to the difference between its volume and V_S." [Translation: the time rate of
change is proportional to the ratio of the difference in volume to the balloon volume itself.]
   If the balloon is being blown up as stated, what should the sign of your proportionality constant be?

▶ solution