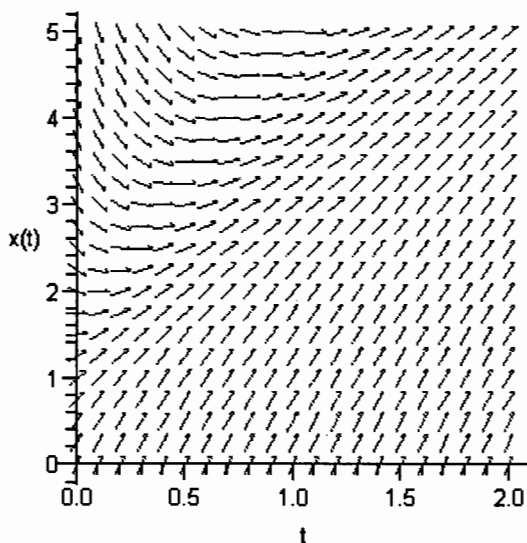


Show all work, including mental steps, in a clearly organized way that speaks for itself. Use proper mathematical notation, identifying expressions by their proper symbols (introducing them if necessary), and use arrows and equal signs when appropriate. Always simplify expressions. BOX final short answers.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

1.  $y' = -2xy, y(0) = 10.$

- a) Find the general solution by hand.
- b) Find the solution which satisfies the initial condition. [Your final answer should be  $y(x) = \dots$ ]
- c) At what positive value of  $x$  does the value of  $y$  drop to one percent of its initial value?

2.  $x'(t) + \frac{3}{1+2t}x(t) = 5, x(0) = \frac{1}{2}.$



- a) Using only the slope field plot, draw in the approximate solution curve with this initial condition  $x(0) = 1/2$ , together with the approximate solution curve for the initial condition  $x(1) = 4$  (circle both initial points).
- b) Find the general solution by hand.
- c) Find the solution which satisfies the initial condition  $x(0) = 1/2$ . [Your final answer should be  $x(t) = \dots$ ]
- d) Check that your general solution actually satisfies the DE by backsubstituting everywhere into the DE and simplifying.
- e) Does your numerical value of  $x(2)$  from part c) agree with the approximate value on your hand drawn curve for that initial condition? Explain.
- f) Finally eyeballing the slope field, hand draw in the isocline of all points for which the slope field has slope zero and label this curve " $m = 0$ ". What is the equation of this curve in the  $t$ - $x$  plane?

► solution

▼ pledge

When you have completed the exam, please read and sign the dr bob integrity pledge and hand this test sheet in on top of your answer sheets as a cover page, with the first test page facing up:

"During this examination, all work has been my own. I give my word that I have not resorted to any ethically questionable means of improving my grade or anyone else's on this examination and that I have not discussed this exam with anyone other than my instructor, nor will I until after the exam period is terminated for all participants."

Signature: \_\_\_\_\_

Date: \_\_\_\_\_