

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 (no decimal approximations, if possible). [See long instructions on reverse].

1. Solve the initial value problem: $dy/dx = 6 \exp(2x) \exp(-y)$, $y(0) = 0$.

2. a) Solve the DEQ: $dy/dx = 2y + \exp(-x)$.

b) Find the solution for which $y(0) = 1$.

c) Check that your solution $y = y(x)$ to part b) satisfies the DEQ by backsubstituting it into the DEQ and simplifying the LHS and RHS separately.

3. **Word Problem:** A prehistoric chikun is found frozen in the ice in a melting glacier (32°F). It is brought into the toasty camp tent kept at 72°F at $t = 0$ [time units: hours]. After $1/2$ hr, it has warmed up to 52°F . How warm is the chikun after 1 hr total in the tent if the chikun's temperature T obeys Newton's law of cooling

$$dT/dt = -k(T-72)?$$

a) First find the general solution $T(t)$ of this separable DEQ by hand.

b) Then impose the appropriate initial condition on it.

c) Then determine the value of k (exactly, if you can).

d) Find the mathematical solution of the word problem and respond to its final question in a plain language English sentence.

Math Exam Rules

READ THESE INSTRUCTIONS CAREFULLY

This test is not about just getting "the right answer", but also presenting and communicating well the process which leads to the results requested in each part of every problem, as well as your understanding of the course content and its vocabulary. [This is good practice for learning how to communicate technical results to other people in a workplace environment.] Unless specifically requested, no results here may be *justified* using technology — a reasoned explanation supported by mathematical facts is always required and cannot be substituted by a technology result. [This course is trying to develop some elementary mathematical thinking skills which help you understand why you are seeing what you see in a technology screen.] However, you are encouraged to use MAPLE (or calculators) to check every result you derive by hand. Come talk to me if you get stuck on any problem or are confused. [For a take home exam, no collaboration is allowed but you may consult your textbook, your notes and my handouts.]

Show **all** work and answers, *including indications of mental steps*, on the lined paper provided. If you copy over work, be sure you include everything. Put your name on each sheet and clearly label continuations of problems from one sheet to another. **LABEL** and **SEPARATE** clearly each part of each problem and **BOX** each short final response requested (and nothing else). Cross out abandoned work not to be considered.

Use proper mathematical notation: "symbol" = "expression representing symbol" = "...", introducing symbols if necessary. Don't misuse equal signs, and don't write down unidentified expressions, but do link expressions which are equal with equal signs, while using arrows or colons to link expressions which are not equal but are related by some step. Give **EXACT ANSWERS**, not decimal approximations, *unless the context warrants it*, but first give the exact result in any case. Always simplify results. **Math is case sensitive: always be consistent with your upper and lower case letters used as symbols.**

Take home test: If you use (computer) technology to check your work, print out your worksheet with comments, handwritten if necessary, labeled by problem, and attach it to your test after your hand work.

When you have completed the exam, please read and sign the dr bob integrity pledge and attach it to your answer sheets (staple take home test) as a cover page, first side face 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: