MTH 302: Skill Quiz 8

This quiz contains the **third and final attempt** at Skill DE.1, the **second appearance** of Skill DE.2, and the **first appearance** of Skill DE.3.

Instructions:

- If you had a "Success" mark on a skill from the first quiz, **do not do the problem for that skill again**. You only need one "Success" on each skill, then you're done.
- You should only be working on the skills that you **need** to work on (because you've never tried them, or you did and got "Retry") *and* you feel **ready** to work on.
- Make sure to consult the Standards for Student Work in MTH 302 document before starting on your work, so you're clear on what is expected and what constitutes a "successful" attempt. Also check the *Success criteria* below each problem.
- As before, you may hand-write your work on paper, hand-write it in a notes app, or type it up. But **please start a new page for each Skill**. If a Skill takes more than one page, that's OK, but **don't put two skills on the same page.**
- When you are ready to submit your work: **Scan** your handwritten work to a clear, legible, black-and-white PDF using a scanner or scanning app -- **one PDF per problem**. So if you are doing both problems, you will have two PDFs: one for Skill LA.1 and another for Skill LA.2 (all parts).
- Then, **upload each PDF to its designated folder** on Blackboard. For example the PDF for Skill LA.2 goes into the folder for Skill LA.2. **Please make sure you have put your work in the right folder, because work in the wrong folder significantly delays the grading process.**
- Make sure to **click "Submit"** after uploading each item, before exiting.

Foundational Skill DE.1

> **DE.1: I can solve a linear, homogeneous first-order differential equation using integration.**

Solve the following differential equations or initial value problems:

1. $y' = \dfrac{1}{100 - t} y$
2. $y' + \dfrac{2}{t} y = 0, y(1) = 4$

Show all integration work by hand. There is a template for a solution that we discussed in class, but on this skill quiz you will need to show all calculus steps.

Success criteria: All work except for basic arithmetic is done by hand, and is present and legible with no gaps or missing steps. The work is correct and leads to the correct solutions in each case. Up to two "simple" errors (copy errors, or basic arithmetic mistakes that do not oversimplify the problem) are allowed, but the resulting solutions must be consistent with the error or errors. (*Warning*: Copy errors or arithmetic mistakes can greatly complicate things! You are strongly advised to double check all copying and computation often.) **You may use technology to do basic arithmetic, but nothing else.**

Foundational Skill DE.2

> **DE.2: I can solve a separable first-order differential equation using integration.**

Solve the following differential equations or initial value problems:

1. $e^{-y}\sin(x) + \dfrac{dy}{dx} = 0$
2. $\dfrac{dy}{dt} = 100 - y$, $y(0) = 105$

Show all integration work by hand. There is a template for a solution that we discussed in class, but on this skill quiz you will need to show all calculus steps.

Success criteria: All work except for basic arithmetic is done by hand, and is present and legible with no gaps or missing steps. The work is correct and leads to the correct solutions in each case. Up to two "simple" errors (copy errors, or basic arithmetic mistakes that do not oversimplify the problem) are allowed, but the resulting solutions must be consistent with the error or errors. (*Warning*: Copy errors or arithmetic mistakes can greatly complicate things! You are strongly advised to double check all copying and computation often.) **You may use technology to do basic arithmetic, but nothing else.**

Foundational Skill DE. 3

> **DE.3: I can generate a numerical solution to a first-order differential equation using Euler's method.**

For the differential equation:

$$\frac{dy}{dx} = -\frac{y}{x} + 3x$$

Suppose that $y(1) = 2$. Using Euler's method with a step size of $h = 0.1$, find the approximate values of $y(1.1), y(1.2), y(1.3)$, and $y(1.4)$. Use five decimal places on each approximation.

You may use a hand calculator for arithmetic work but you **may not** use a spreadsheet, and *all* work must be clearly shown in your writeup.

Success criteria: The algorithm for Euler's method is correctly applied. All work is present and legible with no gaps or missing steps. Up to **one** "simple" errors (copy errors, or basic arithmetic mistakes that do not oversimplify the problem) are allowed, but the resulting solutions must be consistent with the error or errors. Please note, normally two simple errors are allowed, but due to the nature of this problem, arithmetic errors have a greater impact, so only one is allowed.