Grade: /10

AMAT113: Calculus II
Worksheet 3

Due: Monday, February 26, in Class or Digitally

Name:
UAlbany Email:

—— Instructions ——

- This homework should be submitted in class or digitally on the date listed above.
- There are three main ways you might want to write up your work.
  - Write on this pdf using a tablet
  - Print this worksheet and write in the space provided
  - Write your answers on paper, clearly numbering each question and part.
    - If using either of the last two options, you can use an app such as Microsoft Lens to take pictures of your work with your phone and convert them into a single pdf file.
- **You must show all work**. You may receive zero or reduced points for insufficient work. **Your work must be neatly organized and written**. You may receive zero or reduced points for incoherent work.
- If you are writing your answers on anything other than this sheet, you should only have **one question per page**. You can have parts a), b) and c) on the page for example, but problems 1) and 2) should be on separate pages.
- **Put a box or circle around your final answer** for each question.
- The problems on this assignment will be **graded on correctness and completeness**.
- These problems are designed to be done without a calculator. Whilst there is nothing stopping you using a calculator when working through this assignment, be aware of the fact that you are not permitted to use calculators on exams so you might want to practice without one.

1. A particle travels with velocity given by the function $v(t) = 27t^2e^{-3t}$. How far will the particle have traveled when it reaches its maximum velocity?

2. A train is traveling 60 miles per hour when an obstacle is seen on the tracks ahead. The train begins braking at a constant rate. Two minutes later, the train comes to a complete stop one foot away from the obstacle. How far away from the obstacle was the train when it began braking? (be careful with your units)

3. The length of the curve $f(x) = 8\ln(2+\sqrt{x}) - 8\ln(2-\sqrt{x}) - 8\sqrt{x}$ from $x = 0$ to $x = 2$ is $a\ln(b) - b$, where $a =$ _____ and $b =$ _____.

4. Let n be a positive integer. Use integration by parts to reduce $\int x^n \cos(x)dx$ and $\int x^n \sin(x)dx$ in terms of integrals involving x^{n-1}. Use these results to evaluate the following:

$$\int x^5 \cos(x)dx$$