Math Models, Spring 2026: HW 1

Note that some problems or parts of problems may not be graded.

1. Consider the equation

$$m\frac{d^2x}{dt^2} + 2b\frac{dx}{dt} = \frac{x^2 + d}{c^3},$$

where $[x] = L$, $[t] = T$, and $[m] = M$. Find the dimensions of b, c, and d.

If you are taking the class at the 500 level, do the next problem.

2. Let f be a function of x. Let a and b be numbers with the same dimension as x. Using the definition of the definite integral in terms of the limit of Riemann sums, find the dimension of

$$\int_a^b f(x)\,dx.$$

Hint: See the argument I gave in lecture to justify the rule for finding the dimension of a derivative.

Additional Instructions

To facilitate the HW grading, please do the following.

- Write your HW solutions double spaced.
- Write your HW solutions in the same order in which the problems are assigned above.
- Clearly label each problem. Draw a dark box or circle around the label—the point is that I should be able to quickly flip through your HW solution and find a given problem.