(Your Name)
Exercise A2
5 February 2013

You know the drill—reproduce this document up to the horizontal line below. I am still using the built-in buffer `\medskip`. Also, this time I am indenting my paragraphs (except for this one!).

Whoah! This heading is over here!

An underlying theme in linear algebra is that systems of linear equations such as

$$\begin{aligned} 2x_1 + 4x_2 + 8x_3 &= 5 \\ 3x_1 + 6x_2 - 9x_3 &= 2 \end{aligned}$$

can be represented by a single *matrix* equation of the form

$$A\mathbf{x} = \mathbf{b}. \tag{1}$$

For example, in the above linear system the matrix A would be

$$A = \begin{pmatrix} 2 & 4 & 8 \\ 3 & 6 & -9 \end{pmatrix}.$$

If you're keeping score, the matrices $\mathbf{x}$ and $\mathbf{b}$ in equation (1) consist of only one column each.

Integrating a piecewise function isn't too hard as long as the "pieces" are continuous on the closures where they're defined. For example, suppose $f(x)$ is defined as

$$f(x) = \begin{cases} x^2, & x \le 1 \\ 2x, & x > 1. \end{cases}$$

We can easily compute $\int_0^4 f(x)\ dx$ by noting that $[0,4] = [0,1] \cup [1,4]$. By elementary properties of the Riemann integral we have

$$\begin{aligned} \int_0^4 f(x)\ dx &= \int_0^1 f(x)\ dx \ + \ \int_1^4 f(x)\ dx \qquad (2) \\ &= \int_0^1 x^2\ dx \ + \ \int_1^4 2x\ dx \qquad (3) \\ &= \frac{1}{3} \ + \ (16-1) \\ &\approx 15.3. \qquad (4) \end{aligned}$$

Note that line (3) uses the fact that the closure of $(1,4]$ is $[1,4]$, while line (4) is only a decimal approximation.

Once you have finished this assignment, save this file under a <u>different</u> name. In this new file go back and tag the first two equations. Re-compile, and compare the differences. Does the outcome make sense to you?