COLBY COLLEGE
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Assignment 1: Stability and Condition

Due: Thursday 17 September

The purpose of this assignment is to practice using finite-precision floating-point arithmetic, and to examine questions about the stability of algorithms and the condition of problems.

Reading: Faires and Burden, Chapter 1, especially 1.3 and 1.4

Do some arithmetic

1. Answer question 8 in Exercise Set 1.3 on page 19 of Faires and Burden. Remember to round off after every operation. Also, proceed carefully so you don't have to backtrack too many times.

Check the answers and explain

Solving this system using lots of digits, I got the following answers:

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a) x = 2.445, y = -1.636
b) x = 497.4, y = 80.29
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1. Calculate the absolute and relative errors for your answers relative to the correct answers.
2. If you were asked to report the accuracy of the solutions, which type of error would you report?
3. Write a short explanation of the difference in accuracy in the two cases. Hint: look at the subtractions.
4. The first problem is clearly well-conditioned, since we get an accurate answer. With the second problem, though, we don't get an accurate answer. Is that because the problem is ill-conditioned or because the algorithm we are using is only conditionally stable?