P460 Lab 1: Imagine with Simple Lenses/Focal Lengths
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Due Week of 2/24/2022
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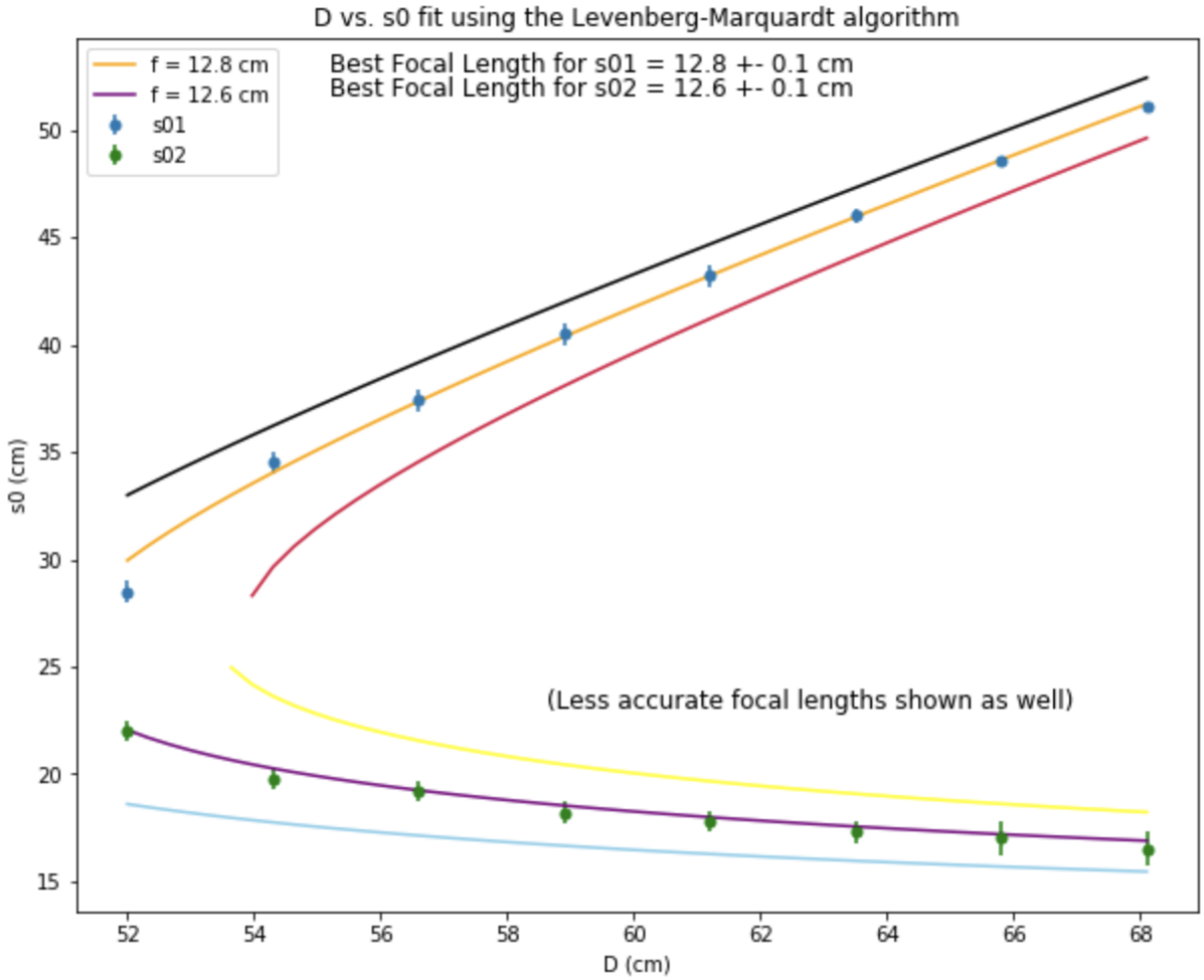
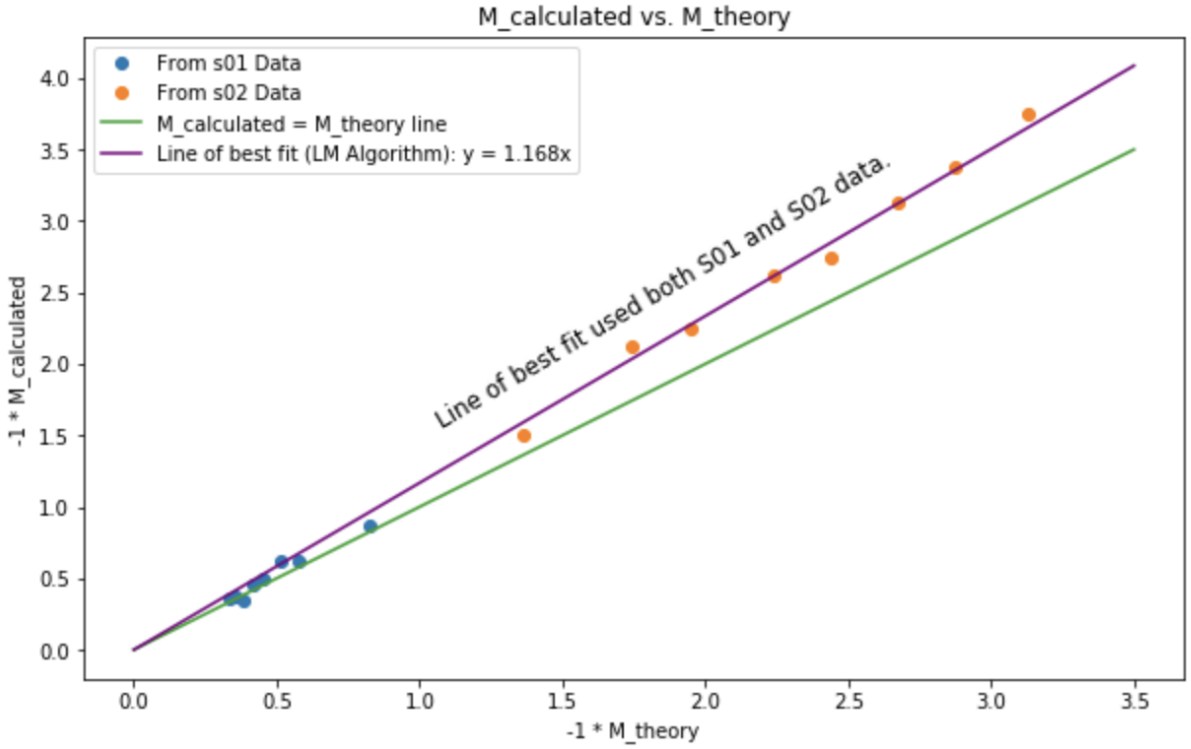
The focal length, f, was measured to be (12.7 ± .1) cm.
All data with errors can be found in this spreadsheet:
https://docs.google.com/spreadsheets/d/1xeOjh84rHT8XeHhqLr-jvQIM3WwElb7cENQaYuxwvqk/edit?usp=sharing



As shown, $s_{0,1}$ to be the s_0 were chosen such that $s_{0,1}$ was closer to the screen than $s_{0,2}$. This also means that b_1 will be smaller than b_2 as shown in the magnification graph (overleaf). This also means that $s_{0,1}$ corresponds to the plus, rather than the minus, in equation (3). For the curve-fitting method, equation (2) was used for $s_{0,1}$ and $s_{0,2}$ data individually. An average of the focal length from the curve-fitting method is (12.7 ± .1) cm. Using error propagation gets an f_1 = (12.7 ± .1) cm and an f_2 = (12.6 ± .1) cm, with an overall weighted f = (12.7 ± .1) cm. Clearly, reporting a focal length of (12.7 ± .1) cm is the best choice. This matches the focal length labeled on the lens.



As shown above, the measured magnification somewhat matched the theoretical magnification. The fitted curve matches the data, especially the $s_{0,2}$ data much better. It should be noted that measuring b_1 was much harder due to the small size, giving more weight to the best fit line's validity. As to why the data differs from a 1:1 correspondence likely has to do with errors associated with the thin lens approximation.