Slide rules rule

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Project Description: Mathematics explains physical phenomena, but, turned on their head, the same principles enable analog computers. We'll study and build our own linear, circular, and helical slide rules, which have long been used to multiply real numbers. Next, we'll proceed to slide rules that multiply complex numbers, which have also been produced commercially, though they don't fit in a pocket even with a heavy-duty pocket protector (`https://collection.maas.museum/object/598597`). Finally, as time, ambition, and eyeroll forbearance allow, we'll generalize to related devices to compose linear functions $x \mapsto mx + b$ over the reals or complexes and even more contrived contraptions to multiply two-by-two matrices over the complexes.

Making ordinary slide rules involves learning a plotting package like LaTeX/TikZ and using a black and white printer or, in a pinch, drawing by hand on graph paper. The more ambitious slide rules will involve some kind of fabrication, e.g., 3-d printing.

Multiplying two-by-two matrices over the complexes amounts to composing Moebius transformations. This is a beautiful theory with wider applications to complex analysis, geometry including linear perspective in art, mapmaking, and special relativity.

Prerequisites: Math 217