# *101 Things to Do on a Wet Afternoon*

*Wendy Rath*

1. Clean the cooker
2. Paint the skirting boards
3. Knit a pair of gloves
4. See if Newton was correct in his assertions that equally spaced parallel lines of numbers could be employed for the extraction of roots of polynomial equations.
5. Deal with that pile of ironing

. . . just a minute, what was number 4?, and so it was that I set out to see if Newton was correct.

Making lots of lines of numbers seemed rather hard work, so I opted for the "Let us get rid of some surplus slide rules and also see what other clutter can be thrown out" method.

Three Thornton slide rules were superglued together side by side and then bolted to a suitable baseboard (in this case my plastic chopping board from the kitchen; well, I needed an excuse to treat myself to a real wooden block). I decided that I would conduct the test with both single and double lines of numbers, and as that necessitated only the B and C scales, the rest were obliterated with typewriter correction fluid. Two holes were drilled and tapped to fix the pivoting line in accordance with whichever set of lines I was using[1].

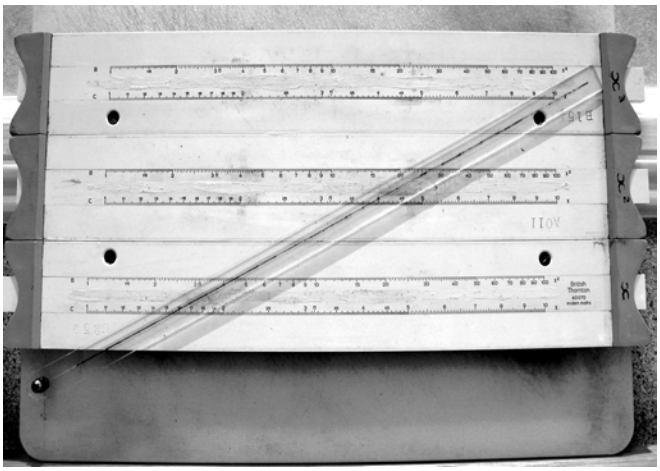

Figure 1. Wendy's Newtonian polynomial solver.

I now had the wherewithal to solve a suitable cubic equation, so I kicked a ball over my neighbor's garden wall into his goldfish pond, in order that I could solve the problem of how much of the ball was below the waterline whilst it floated there—much to his annoyance.

Now as you all must surely know (using Archimedes' Principle) the ball floats displacing the weight of water that equals the weight of the ball. I could bore the reader with all of the mathematics, but that has all been published. Suffice it to say that if the ball weighs 1.1 pounds and has a diameter of 11.81 inches, then the resulting equation is:

$$x^3 - 17.715\,x^2 + 29.126 = 0$$

where $x$ is the depth of the ball below the waterline.

So, swing the movable line around the pivot, do the appropriate addition or subtractions and get three values of $x$, as it is a cubic equation whose roots we are abstracting. In our case the answers are 1.33, 17.62 and -1.24 inches, but of course only 1.33 inches is correct: 17.62 inches may fit the equation, but not the ball, and -1.24 inches is not an option. So yes, Newton's device does appear to work, but try it using the metric equivalents of 500 grams weight and a 30-centimeter diameter and it turns out to get more awkward. Oh look, it has stopped raining and the sun has come out . . . .

**101 Things to Do in the Garden**

1) dig the potato patch, 2) paint the garden fence, 3) retrieve ball from neighbor's fishpond . . . .

Figure 2. Wendy competing at the IM2002 Slide Rule Contest.

[1]See Wendy's article: Rath, W., "The Solving of Equations", *Slide Rule Gazette*, 1, p82-186, 2001, and Sanguin, C.J., "Newton's Polynomial Solver", *Journal of the Oughtred Society, 11:1, 2002.*