Problem of the Week #16

Assigned: 03 Feb 11

Due: 10 Feb 11

The Gramophone

The vinyl record was a popular sound storage medium for almost a century. Sound waves were recorded onto the surface of the disk-shaped record in a spiral pattern starting at the outer edge and working inward. A needle on the phonograph would glide along the recorded sound wave, amplifying it mechanically or electronically.

MAJ Marks selects and plays a 10" (diameter) vinyl record with a playing speed of 78 rpm. When the music finishes, he notes that the song lasted exactly 3 minutes and that the needle, at the end of the song, had moved from the outer edge of the record to a distance of 2" from the center.

What is the physical length of the recorded sound wave?

Bonus: How far is the needle from the center of the disk exactly half way through the song?

Email solutions to Christopher.marks@usma.edu with subject line: POTW.

Solutions can be emailed in the form of: an email (plain text) no attachment, a word document, a mathematica file, an excel workbook, or a scanned adobe file of your work.

If none of these options work for you, you may drop a hardcopy off at my office TH239C, just annotate the time of submission.