

Precalculus Lessons Using Technology

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The Pierce College mathematics department is blessed with a Math Computer Classroom that has 20 networked 486 computers equipped with Mathematica, Derive, Mathcad, Minitab, and Geometers Sketchpad (thanks to NSF grant DUE-9451326). Bob Martinez, Thom Putnam, Kathie Yoder, Kathy Yoshiwara, and I have, working collaboratively and individually, created a few dozen computer lessons appropriate for precalculus mathematics.

We chose to write all the lessons using Mathcad because we felt that it was the best software package for our needs, providing a relatively easy interface for the students, great flexibility in visual format, and considerable computing power. However all of the lessons could be reasonably well translated into a programmable computer algebra system like Maple or Mathematica, and many could be adapted to Derive or even a graphing calculator.

We use two different basic formats for our computer lessons. In one format, the students create their own Mathcad document—entering all text, formulas, and figures themselves—based on the instructions and tasks provided by the instructor. In the other format, the instructor creates and saves a lesson as a Mathcad document, and the students open and explore that document. Either way, the students use the technology to discover and explore. Both formats have a huge advantage over the computer tutorials: the students are not limited by what the author put into the lesson and always have available the full power of Mathcad to blaze their own trails.

Examples of the first format can be found in almost any collection of math labs or projects, and these are easily adapted to platforms other than Mathcad. But the second format of computer lessons cannot be properly appreciated without actually using the software. In these lessons the author supplies not merely text but also (usually hidden) code, allowing the student to focus on the mathematical ideas. One important feature that the author can sometimes create is a means to inform the students that they have correctly answered a question in the lesson. (The students are confident that the software will carry out their commands, but they are often unsure if they are giving the right commands!)

We have collected examples of our lessons in two Mathcad “handbooks.” One is simply the set of precalculus lessons we wrote in Spring 1995, and there are occasional overlaps between two instructors' versions of the same lesson. We also have the handbook my students used in Spring 1996, which borrowed heavily from the previous year's work but also includes new lessons. We are happy to share both handbooks with colleagues who have access to Mathcad 6.0. (Actually, Mathcad 5.0 should be sufficient for reading the Spring 1995 handbook.)

We are hoping to create a handbook with a more comprehensive list of precalculus topics. Our goal is to make the lessons flexible enough to accommodate a variety of uses. One instructor might simply use one or two of the lessons to supplement a course, another instructor may assign lessons as review, a third could use the handbook as the core of a computer intensive course in precalculus.

We are interested in any suggestions or questions you may have.