
Three-dimensional coordinate systems and more parametric surfaces

Today we consider nonrectangular three-dimensional coordinate systems, and we use these coordinates to help us parametrize certain surfaces. There are two such coordinate systems that we use frequently in this course.

Cylindrical Coordinates

Cylindrical coordinates consist of polar coordinates in the xy -plane along with the usual rectangular coordinate z . Unlike polar coordinates, we often restrict our attention to the situation where $r \geq 0$.

Example. Use cylindrical coordinates to parametrize the hyperboloid of one sheet

$$x^2 + y^2 - z^2 = 1.$$

Spherical coordinates

Another three-dimensional coordinate system that is often convenient to use is the spherical coordinate system.

Example. Parametrize the unit sphere using spherical coordinates.

We can also parametrize ellipsoids and plot many unusual surfaces with spherical coordinates.

MA 225 Exam Logistics

1. Bring pen/pencil and id. You may use your calculator if you wish. If you have a calculator that does symbolic derivatives/integrals, you should make sure that your answer shows that you could do the problem without your calculator.
2. Closed book exam. No extra papers. No ipods, cell phones, etc.
3. Exam will start promptly at 10:00 and end at 10:50.
4. We will collect exams by moving up the aisles. You must pass in your exam when we arrive at your aisle. Please remain seated and quiet until we collect the exams from your aisle.
5. Five minute rule will be in effect: No one will be allowed to leave the exam between 10:45 and 10:50. Use those 5 minutes to check your work.
6. Seating will be assigned before the exam starts.
7. If you have a question, raise your hand. Stay seated.
8. Go to the bathroom before the exam starts.