Basic skills list for the 126 Midterm 1

The following is a collection of some of the things you are expected to be able to do on the first midterm. It is intended as a starting point, not as a comprehensive summary of the course: review all lectures, reading materials, and homework problems to get the complete picture.

1. Taylor Polynomials and Series

   You should be able to:

   (a) Determine the Taylor polynomial of specified order for a given function and base point.

   (b) Determine the Taylor series of a given function, and express it as either (1) a closed form series expression, e.g. $\sum_{n=0}^{\infty} \frac{n^2}{n!} x^n$, or (2) the first several terms of the series, e.g. $1 + 2x - 4x^2 - 8x^3 + 16x^4 - \cdots$.

   (c) Use a Taylor polynomial to approximate a value of a function (like $\cos 0.3$) and give a bound on the error (i.e., be able to say the error is no more than some z).

   (d) Use a Taylor polynomial to approximate a definite integral

   (e) Derive a Taylor series or polynomial for a function using integration, differentiation or substitution.

2. Vectors, basic You should be able to determine or find:

   (a) The magnitude of a vector

   (b) The **dot product** of two vectors

   (c) The **cross product** of two vectors

   (d) The angle between two vectors

   (e) Whether or not two vectors are parallel

   (f) Whether or not two vectors are perpendicular

3. Lines, planes, and points in 3D

   You should be able to determine or find:

   (a) The center and radius of a sphere given by its equation

   (b) The point of intersection of two lines

   (c) The line of intersection of two planes

   (d) The equation of a line passing through two given points

   (e) The equation of a plane passing through three given points

   (f) The equation of a plane passing through a point, parallel to a given plane

   (g) The equation of a plane containing a line and a given point

   (h) The angle between two intersecting planes

   (i) The angle between two intersecting lines

   (j) Whether or not a point is part of a given line, or a given plane

   (k) Whether or not a line is part of a given plane

(l) Whether or not two planes intersect or are parallel

(m) Whether or not two lines intersect or are parallel

(n) Whether or not two sets of equations define the same, or different, lines or planes

4. Cylinders and Quadric Surfaces

   You should be able to:

   (a) identify a quadric surface from its equation

   (b) identify a cylinder given its equation (i.e., be able to tell that is is a cylinder)

   (c) identify a quadric surface from a sketch of one