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. Parametric and polar stuff

   You should be able to determine or find:

   (a) $\frac{dy}{dx}$ given $x = f(t)$ and $y = g(t)$

   (b) the tangent line to a curve defined parametrically

   (c) the arc length of (a piece of) a curve specified by $x = f(t)$, $y = g(t)$

   (d) the Cartesian equation of a curve defined using polar equations, and vice versa

   (e) the tangent line to a curve defined with a polar equation

3. 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 angle between two vectors

   (d) Whether or not two vectors are parallel

   (e) Whether or not two vectors are perpendicular