Basic skills list for Math 126 Exam II

The following is a collection of some of the things you are expected to be able to do on the second 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.

- Vector functions

  Given a vector function $\vec{r}(t)$, you should be able to:

  - compute curvature
  - find unit tangent, normal, and bi-normal vectors
  - find normal and osculating planes
  - solve problems involving position, velocity, speed and acceleration of an object moving along the curve defined by $\vec{r}(t)$

- Two-variable functions

  - Given a function $z = f(x, y)$, you should be able to:
    - draw and interpret level curves and contour maps
    - find and sketch the domain
    - compute and interpret partial derivatives (including by implicit differentiation)
    - find the equation of a tangent plane
    - use linear approximation to approximate a specific value of z
    - compute and interpret the total differential
    - find all critical points and use the Second Derivative Test to classify the critical points
    - find the global optima of $f(x, y)$ on a closed region
  - You should be able to set up and solve applied optimization problems involving functions of two variables.

- Double Integrals

  You should be able to:

  - approximate double integrals using Riemann sums
  - compute and interpret double integrals in Cartesian and polar coordinates
  - reverse the order of integration in a double integral
  - compute mass and center of mass