MA 341 Final Exam Review
The final exam will be Wednesday, December 12, 10:30 am to 12:30 pm, in our regular room.

1. Read and review the "Log of Class Activities" from the course website through Friday, December 7.

2. Read and review the document on the course website called "Area and Volume Problems," near the top of the website. In particular, know how to do these problems 1–29, 39–41.

3. Read and review Homework #8, including solutions to be posted on the course website.

4. In particular be able to do the following, and problems similar to the following. I may directly ask some questions just like these, but I may also ask related questions that are not exactly like these.

   (a) Starting with the formula for the area of a square, be able to use dissection methods to derive the area formulas for common polygons such as a rectangle, parallelogram, triangle, trapezoid, and regular polygon (with given apothem and perimeter) (e.g., HW problem 1).

   (b) Be able to derive and use the formula for the area of a triangle given the coordinates of its vertices (e.g., HW problem 3).

   (c) Be able to state Cavalieri's Principle for two-dimensional figures and use it to derive the area formula for a parallelogram (by comparing it to a rectangle) and other figures.

   (d) Be able to use calculus to derive the area formulas for the area of a square, rectangle, parallelogram, triangle, and trapezoid.

   (e) Be able to provide several arguments to motivate the formula for the area of a circle—cutting into pie-shaped pieces, or "unrolling" concentric circles (e.g., HW problem 8).

   (f) Be able to motivate the relationship between the area formula and the circumference formula for a circle using calculus (e.g., HW problem 9).

   (g) Be able to use the above results to find areas of other figures (e.g., HW problem 4).

   (h) Be able to use calculus to derive the volumes of various objects such as prisms, spheres, cones, and pyramids (e.g., HW problems 6 and 11).

(i) Be able to use basic volume formulas to find volumes of other objects (e.g., HW problem 12).

(j) Be able to derive the surface area formulas for a prism, cylinder, circular cone, and for a pyramid with regular polygonal base (e.g., HW problems 2 and 5).

(k) Be able to state Cavalieri's Principle for three-dimensional figures and use it to derive the volume formula for a sphere (or hemisphere) and other figures (e.g., HW problem 7).

(l) Be able to motivate the relationship between the volume formula and the surface area formula for a sphere by cutting it into shapes that approximate pyramids (e.g., HW problem 8).

(m) Be able to motivate the relationship between the volume formula and the surface area formula for a sphere using calculus (e.g., HW problem 9).

(n) If two figures are similar with a scaling factor of k, be able to relate their areas, surface areas, and volumes (e.g., HW problem 10).

(o) Be able to use calculus to solve problems of maximizing area given perimeter, minimizing perimeter given area, maximizing volume given surface area, and minimizing surface area given volume (e.g., HW problem 13).

(p) Be able to model some algebraic formulas by geometric objects (e.g., HW problem 14).