MATH 200
Marked Homework 7
Due Friday 2016 March 11 at the beginning of class

Homework submitted late will not be marked.

1. Estimate the value of \( \int \int_R (1 - xy^2) \, dA \), where \( R = [0, 4] \times [-1, 2] \), by evaluating a Riemann sum with \( m = 2 \) subrectangles in the \( x \)-direction and \( n = 3 \) subrectangles in the \( y \)-direction. Take sample points to be the lower right corners of the subrectangles. You can use a calculator.

2. Prove that the hyperbolic paraboloid \( z = 3y^2 - x^2 + 2 \) lies above the \( xy \)-plane for all \((x, y)\) belonging to \( R = [-1, 1] \times [1, 2] \), and determine the volume of the solid that lies under the hyperbolic paraboloid and above \( R \).

3. Find the average value of \( f(x, y) = e^y \sqrt{x + e^y} \), over the rectangle \( R \) that has vertices \((0, 0), (4, 0), (4, 1), (0, 1)\).

4. Find the volume of the bounded solid enclosed by the elliptic paraboloid \( z = x^2 + 3y^2 \), and the planes \( x = 0, y = 1, x = y, z = 0 \).

5. Find the volume of the bounded solid enclosed by the parabolic cylinder \( y = x^2 \), and the planes \( z = 3y \) and \( z = 2 + y \).

6. Evaluate
\[
\int_0^1 \int_x^1 e^{x/y} \, dy \, dx.
\]