7.) What is the maximum number of rectangles which can be formed within the boundary of the given figure using 100 vertical lines? Count all rectangles including overlapping ones.

2.) Evaluate the double integral \[ \int_0^1 \int_0^x (2x - 3y^2) \, dy \, dx \, . \]
3.) Evaluate the double integral $\int_0^2 \int_{y/2}^1 e^{-x^2} \, dx \, dy$. (HINT: Switch the order of integration.)

4.) SET BUT DO NOT EVALUATE the double integral(s) for the average value of the function $f(x, y) = xy$ over the region $R$ given in the diagram.
5.) Find and classify each critical point as that which determines a relative maximum value, a relative minimum value, or a saddle point for the function

\[ f(x, y) = x^3 - y^3 + 3xy \]
6.) Use the Method of Lagrange Multipliers to minimize \( f(x, y, z) = x^2 + y^2 + z^2 \)
subject to the constraint \( x - 2y + 6z = 82 \)
1.) Determine the \( n \text{th} \) term (starting with \( n = 1 \)) of each of the following sequences.
   a.) 2, 4, 6, 8, 10, ... 
   b.) 1, 5, 9, 13, 17, ... 
   c.) \( \frac{2}{1}, \frac{-4}{4}, \frac{8}{9}, \frac{-16}{16}, \frac{32}{25}, ... \)

2.) Determine whether each series converges or diverges. Briefly explain and name the test that you are using.
   a.) \( \sum_{n=1}^{\infty} n^{-4} \)
   b.) \( \sum_{n=0}^{\infty} \frac{3^n}{(n + 1)!} \)
   c.) \( \sum_{n=1}^{\infty} \cos \left( \pi + \frac{1}{n^2} \right) \)
   d.) \( \sum_{n=2}^{\infty} \left( \frac{4}{3} \right)^n \)