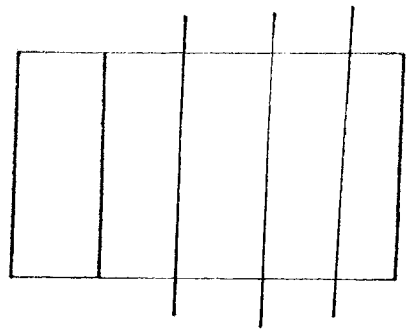
7.) What is the maximum number of rectangles which can be formed within the boundary of the given figure using 100 vertical lines ? Count all rectangles including overlapping ones.



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 nth term (starting with $n = 1$) of each of the following sequences.

a.) $2, 4, 6, 8, 10, \cdots$

b.) $1, 5, 9, 13, 17, \cdots$

c.) $\frac{2}{1}, \frac{-4}{4}, \frac{8}{9}, \frac{-16}{16}, \frac{32}{25}, \cdots$

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.) $\sum_{n=2}^{\infty} \left(\frac{4}{3}\right)^n$