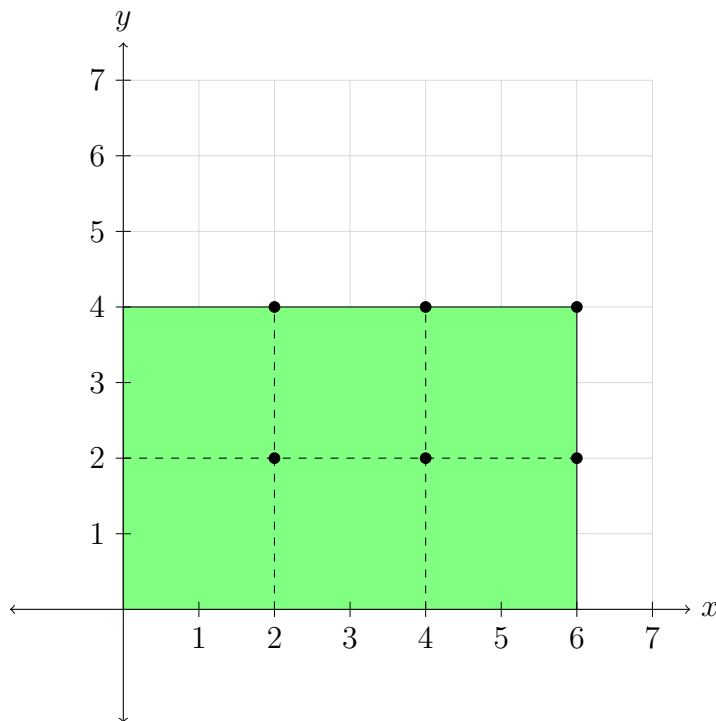


15.1 - Double Integrals over Rectangles

1. Estimate the volume of the solid that lies below the surface $z = xy$ and above the rectangle contained in the xy -plane $R = [0, 6] \times [0, 4]$. Use $\Delta x = 3$ and $\Delta y = 2$ and each sample point (x_k, y_k) is the upper right corner of the k th rectangle.

R is drawn to the right with dashed lines representing the appropriate rectangles and the sample points are marked.



2. Estimate $\int \int_R \sin(x + y) \, dA$ where $R = [0, \pi] \times [0, \pi]$ and $\Delta x = \Delta y = 2$ with sample points at the lower left corners of each rectangle.

3. Evaluate each double integral by identifying it as the volume of a solid and using a known formula

(a) $\int \int_R 3 \, dA$ where $R = \{(x, y) \mid -2 \leq x \leq 2, 1 \leq y \leq 6\}$

(b) $\int \int_R (4 - 2y) \, dA$, $R = [0, 1] \times [0, 1]$

Hint: First draw $z = 4 - 2y$ in the yz -plane and then use that to visualize what the portion of the plane $z = 4 - 2y$ looks like over the given region.