To approximate the volume, let R be the planar region corresponding to the surface of the water in the pool, and place R on coordinate axes so that x and y correspond to the dimensions given. Then we define $f(x, y)$ to be the depth of the water at (x, y), so the volume of water in the pool is the volume of the solid that lies above the rectangle $R = [0, 20] \times [0, 30]$ and below the graph of $f(x, y)$. We can estimate this volume using the Midpoint Rule with $m = 2$ and $n = 3$, so $\Delta A = 100$. Each subrectangle with its midpoint is shown in the figure. Then

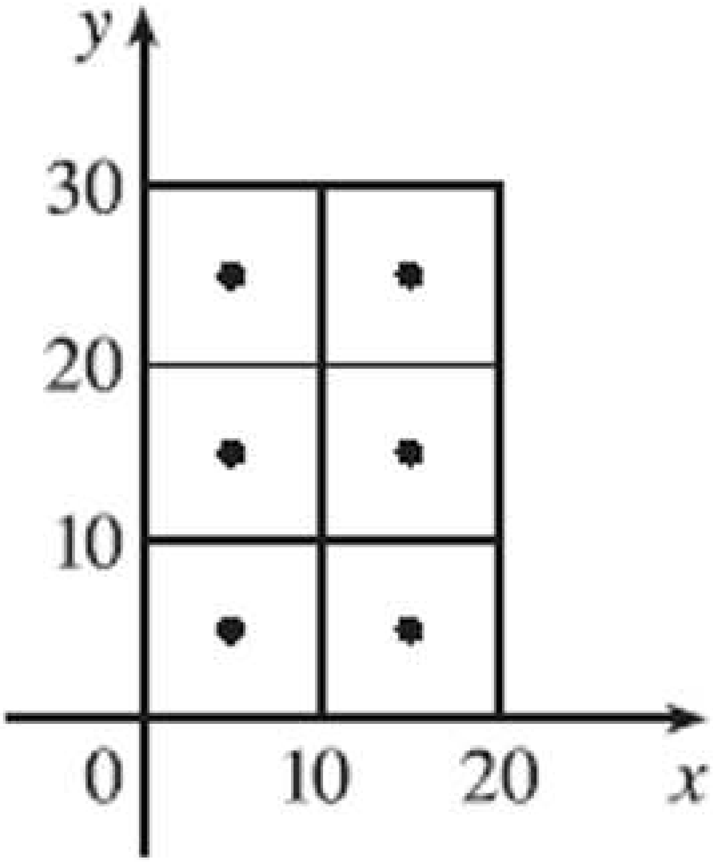
$$\begin{aligned} V &\approx \sum_{i=1}^{2} \sum_{j=1}^{3} f(\overline{x}_i, \overline{y}_j)\,\Delta A = \Delta A[f(5,5) + f(5,15) + f(5,25) + f(15,5) + f(15,15) + f(15,25)] \\ &= 100(4 + 7 + 9 + 3 + 5 + 7) = 3500 \end{aligned}$$

Thus, we estimate that the pool contains 3500 cubic feet of water.

Alternatively, we can approximate the volume with a Riemann sum where $m = 4$, $n = 6$ and the sample points are taken to be, for example, the upper right corner of each subrectangle. Then $\Delta A = 25$ and

$$\begin{aligned} V &\approx \sum_{i=1}^{4} \sum_{j=1}^{6} f(x_i, y_j)\,\Delta A = 25[4 + 5 + 7 + 8 + 9 + 8 + 4 + 6 + 8 + 10 + 12 + 10 + 3 + 4 \\ &\quad + 5 + 6 + 7 + 7 + 2 + 2 + 2 + 3 + 4 + 4] = 25(135) = 3375 \end{aligned}$$

So we estimate that the pool contains 3375 ft^3 of water.


y
30
20
10
0
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