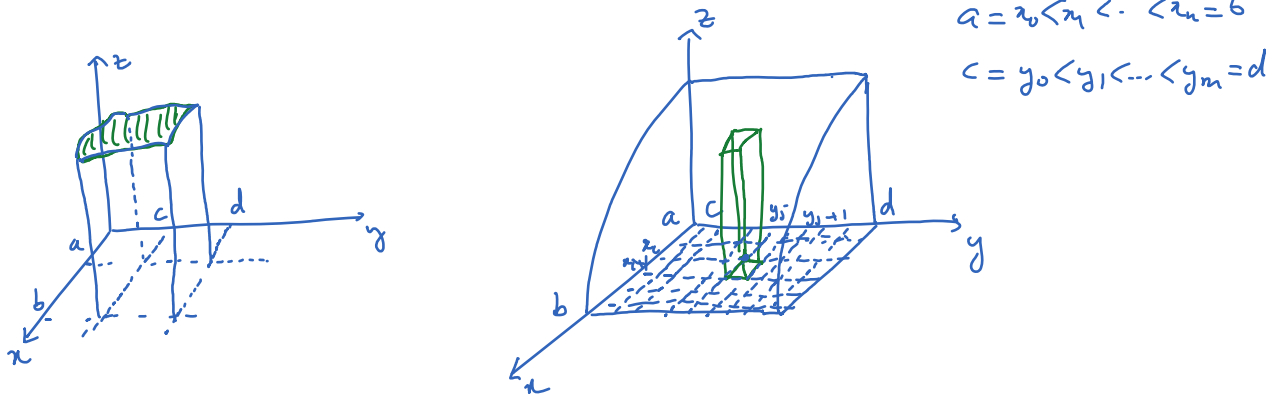


Lecture 23

Monday, February 20, 2023 11:59 AM

* Questions...

We have learned derivatives. Now we will explore integrals to find the volume of the solid under a surface.



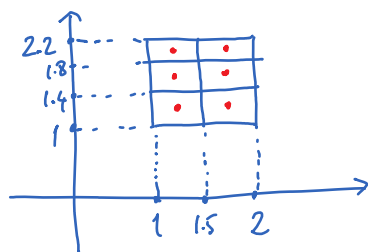
The volume of the green french-fry is about $f(x_i^*, y_j^*) \Delta A$, where $\Delta A = (\Delta x)(\Delta y)$. Therefore, the volume of the solid under the surface is approximately

$$\sum_{i,j} f(x_i^*, y_j^*) \Delta A$$

Ex Find the approximate volume of the solid under the surface

$$f(x, y) = xy$$

and above the rectangle $R = [1, 2] \times [1, 2]$ with $n=2$ and $m=3$ using the midpoint rule.



$$\Delta A = (0.5)(0.4) = 0.2$$

$$\begin{aligned}
 \text{Volume} &\approx f(1.25, 1.2) \cdot 0.2 + f(1.25, 1.6) \cdot 0.2 \\
 &+ f(1.25, 2) \cdot 0.2 + f(1.75, 1.2) \cdot 0.2 \\
 &+ f(1.75, 1.6) \cdot 0.2 + f(1.75, 2) \cdot 0.2 \\
 &\approx 2.88 \dots
 \end{aligned}$$