

**Applications of Partial Differentiation**  
*Extremes within restricted domains*

**Question**

Find the maximum and minimum values of

$$f(x, y) = \sin x \cos y$$

On the closed triangle bounded by  $x = 0$ ,  $y = 0$  and  $x + y = 2\pi$ .

**Answer**

$$-1 \leq f(x, y) = \sin x \cos y \leq 1, \quad \text{everywhere}$$

And

$$\begin{aligned} f(\pi/2, 0) &= 1 \\ f(3\pi/2, 0) &= -1 \end{aligned}$$

Both  $(\pi/2, 0)$  and  $(3\pi/2, 0)$  are on the triangle.

$$\begin{aligned} \Rightarrow \min(f) &= -1 \\ \max(f) &= 1 \end{aligned}$$