

Question #44017, Math, Calculus

IF X AND Y =K,(K>0)

THEN SHOW THAT XY IS MAXIMUM WHEN X=Y, WHERE X AND Y ARE POSITIVE

Answer.

$$x + y = k \rightarrow y = k - x \rightarrow xy = x(k - x) = kx - x^2.$$

Function $f(x) = kx - x^2 = -(x - \frac{k}{2})^2 + \frac{k^2}{4}$ has maximum $f_{max} = \frac{k^2}{4}$

when $x = \frac{k}{2} > 0$.

$$y = k - x = k - \frac{k}{2} = \frac{k}{2} = x.$$

Therefore, function $f(x, y) = xy$ has maximum when $x = y = \frac{k}{2}$.