

# Maths for ML II

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Nipun Batra

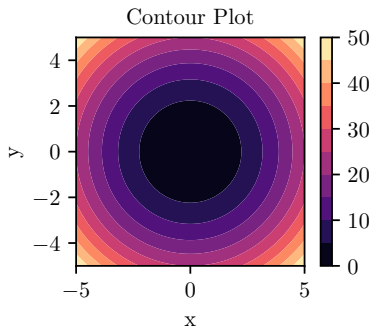
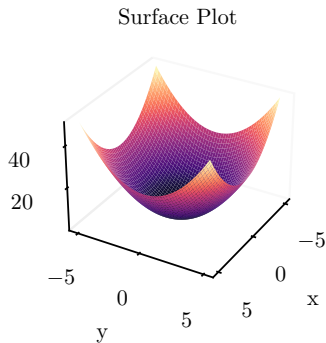
December 27, 2023

IIT Gandhinagar

# Contour Plot

$$z = f(x, y) = x^2 + y^2$$

Notebook: [contour.html](#)

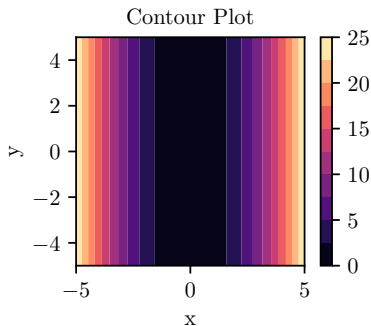
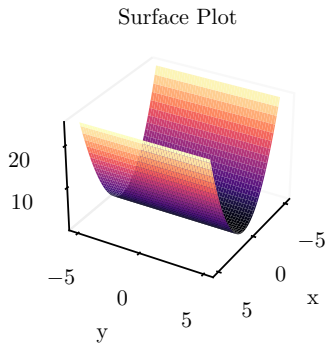


Then plot  $f(x, y) = K$  for varying  $K$ .

# Contour Plot

$$z = f(x, y) = x^2$$

Notebook: [contour.html](#)



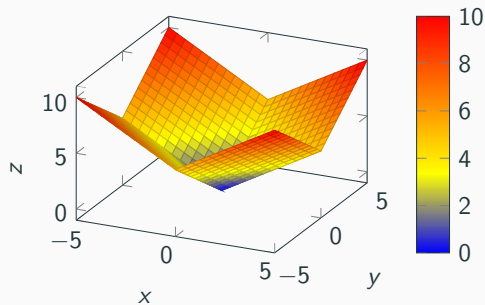
## Contour Plot

$$z = f(x, y) = |x| + |y|$$

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$$z = f(x, y) = |x| + |y|$$

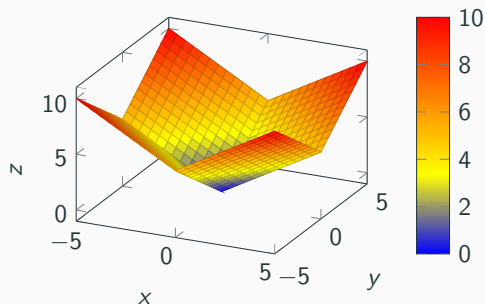
Surface Plot



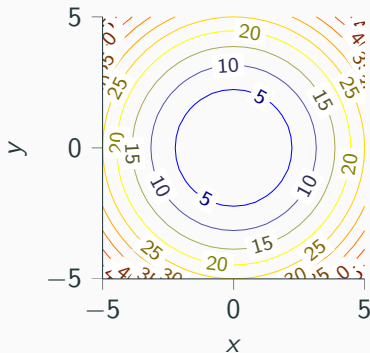
# Contour Plot

$$z = f(x, y) = |x| + |y|$$

Surface Plot



Contour plot, view from top



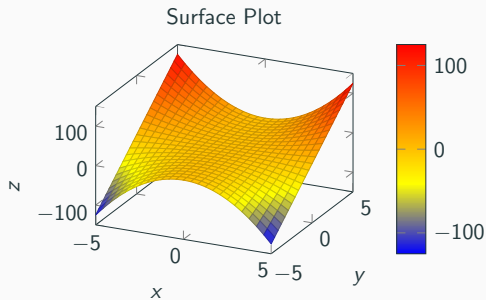
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# Contour Plot

$$z = f(x, y) = (x^2) * y$$

# Contour Plot

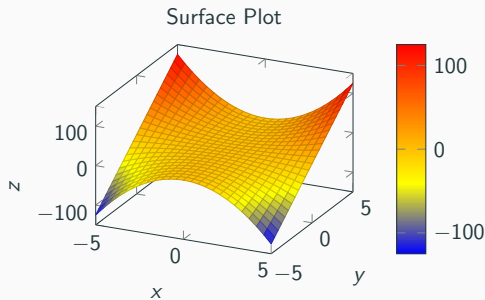
$$z = f(x, y) = (x^2) * y$$



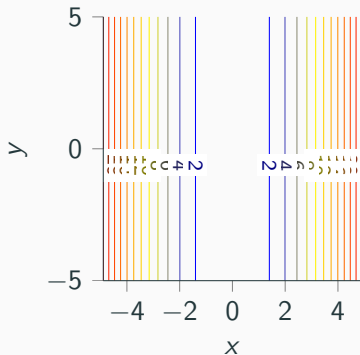


# Contour Plot

$$z = f(x, y) = (x^2) * y$$



Contour plot, view from top



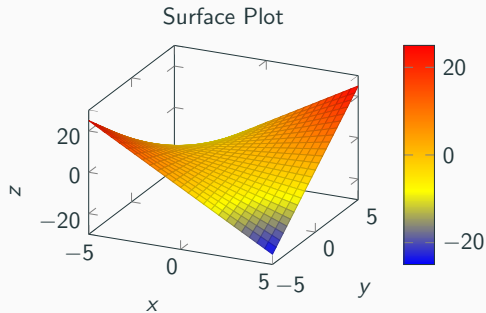
Then plot  $f(x, y) = K$  for varying  $K$ .

# Contour Plot

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

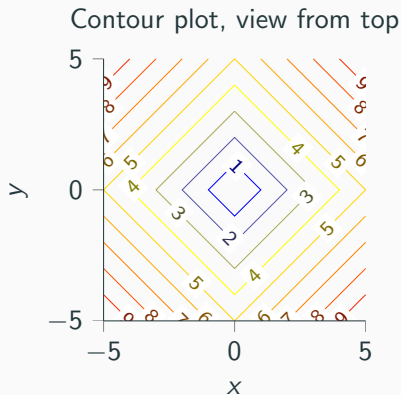
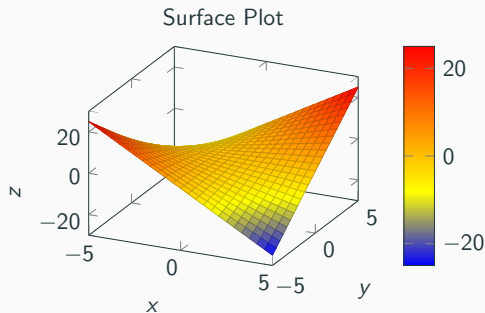
# Contour Plot

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



# Contour Plot

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



Then plot  $f(x, y) = K$  for varying  $K$ .

## Contours plots and gradients

Gradient denotes the steepest change.

All points on the contour have the same  $f(x, y)$

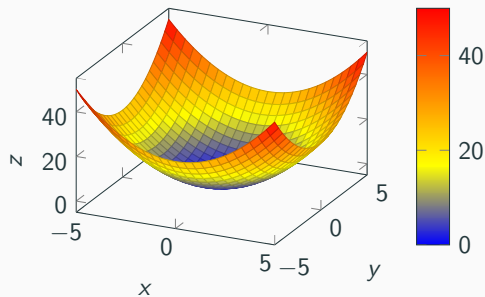
## Contour Plot And Gradients

$$z = f(x, y) = x^2 + y^2$$

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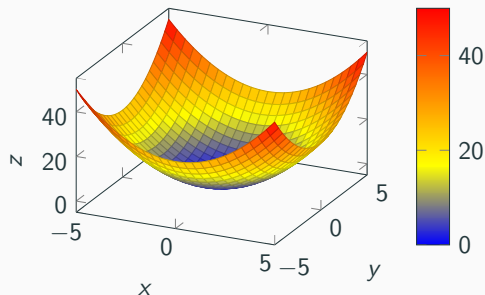
Surface Plot



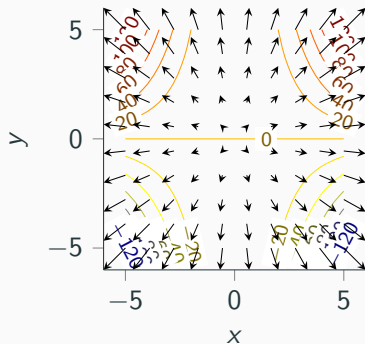
# Contour Plot And Gradients

$$z = f(x, y) = x^2 + y^2$$

Surface Plot



Contour plot, view from top



Then plot  $f(x, y) = K$  for varying  $K$ .



## Contour Plots and Gradients

Gradient denotes the direction of steepest descent.

All points on the contour have the same  $f(x,y)$ .

Gradient denotes the direction in which there is a maximum increase in  $f(x,y)$