

# Today: More on 2-D and 3-D Continuous Data

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Today: Defining Contour Plots and Heat Maps  
Visualizing High-D Structure

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# Lab Exam, 1-D KDE, Writing about 2-D Continuous Data

## 2-D Kernel Density Estimation

Goal: Estimate the joint distribution of  $X_1, X_2$ :

Assuming  $X_1$  and  $X_2$  are independent:

Assuming  $X_1$  and  $X_2$  are dependent:

# Contour Plots

Level Sets:

Contour Plots:

# Heat Maps

# Visualizing High-D Structure / Projections

What do we do when we have **many** continuous variables?

**Projections:** Sometimes we want to project the high dimensional data into a smaller subspace without losing “important structure”.

Multi-dimensional scaling: looks for a configuration in a  $k$ -dimensional subspace such that the distances between observations in the subspace best match the distances in the original  $p$ -dimensional space.