Continuous random variables

Philosophical issues

1. Mathematically, continuous and discrete random variables are very different.
2. *Quantitatively* , however, some continuous models are very close to some discrete models.
3. Therefore, which kind of model to use for a given system is a matter of *convenience* .

Continuous random variables

Philosophical issues

Example: The production process for small metal parts (nuts, bolts, washers, etc.) might better be modeled as a continuous flow than a large number of discrete parts.

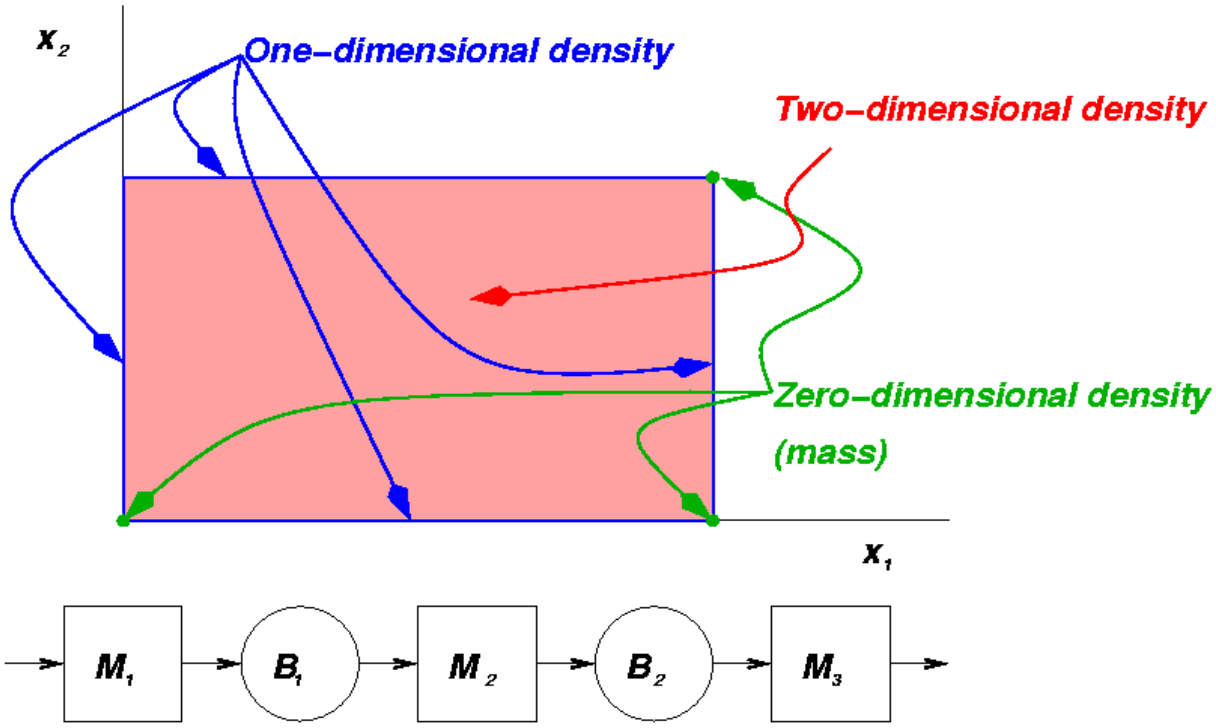
Continuous random variables

- Continuous random variables can be defined
  - ⋆ in one, two, three, ..., infinite dimensional spaces;
  - ⋆ in finite or infinite regions of the spaces.
- Continuous random variables can have
  - ⋆ probability measures with the same dimensionality as the space;
  - ⋆ lower dimensionality than the space;
  - ⋆ a mix of dimensions.

Continuous random variables

Spaces

Dimensionality

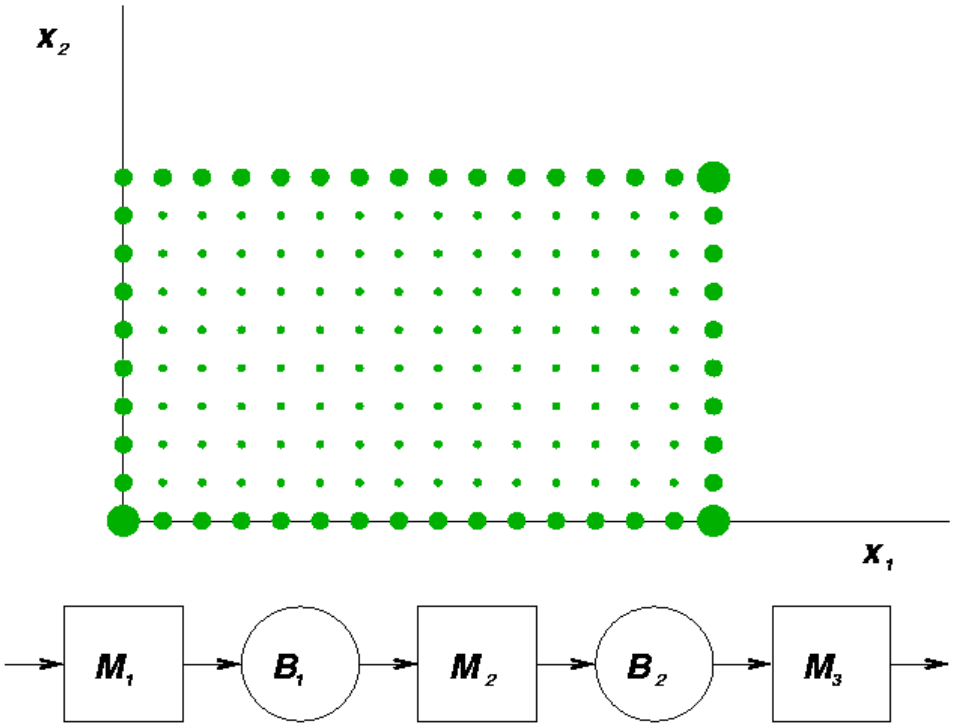


Probability distribution of the amount of material in each of the two buffers.

Continuous random variables

Spaces

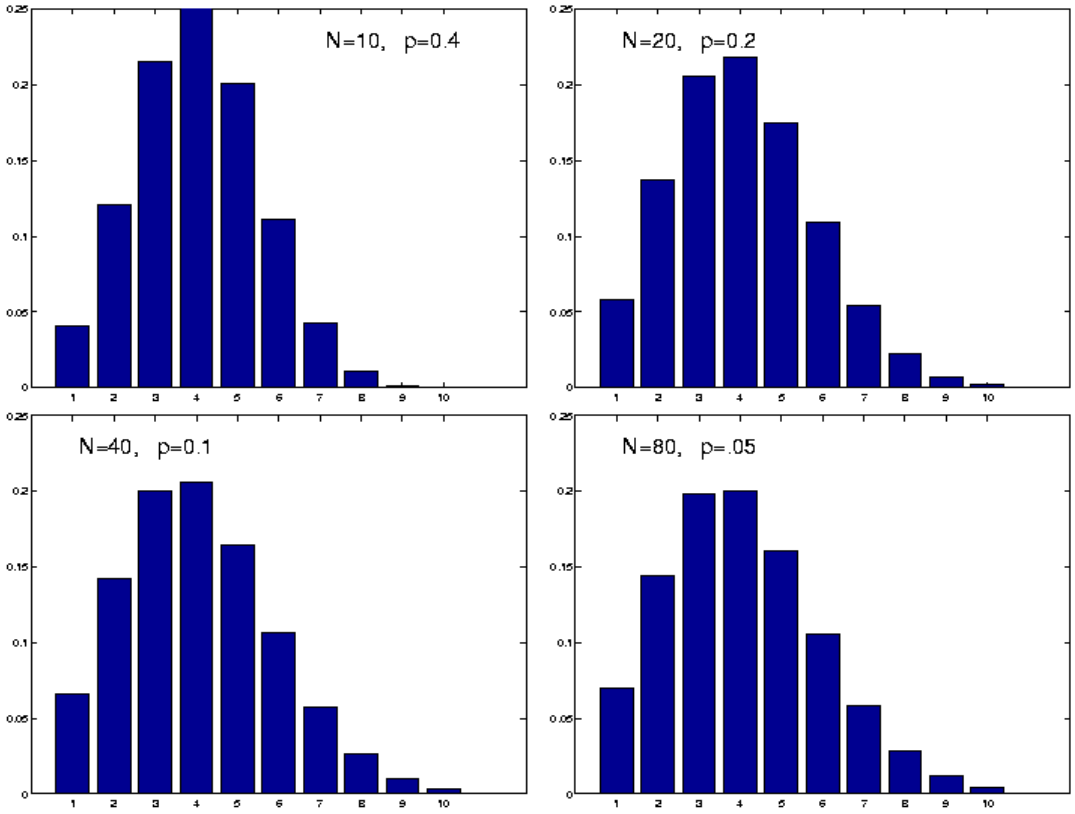
Discrete approximation



Probability distribution of the amount of material in each of the two buffers.

Binomial distributions

Why are these distributions so similar?



Binomial distributions

Binomial for large N approaches normal.