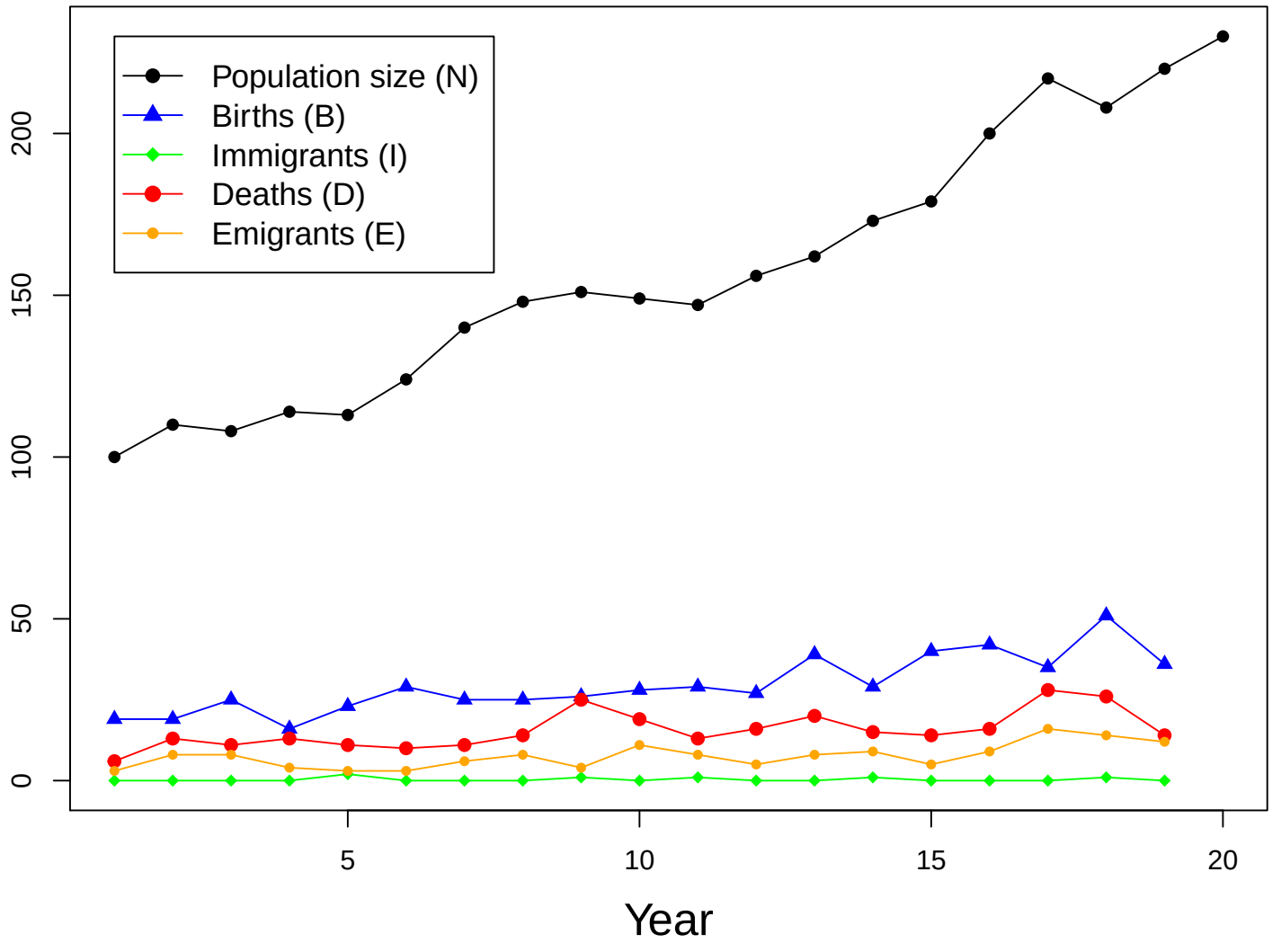
# The BIDE model



# Today's topics

1. Definitions
2. Modeling 101
3. BIDE
4. Assignment

**Population dynamics**

The study of spatial and temporal variation in population size and structure

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**Population size and structure**
*Size:* Abundance
*Structure:* Distribution of individuals among age groups, sexes, habitat patches, etc. . .

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# Models and science

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Models help us...

- Describe complex natural systems in a manageable way
- Formalize and evaluate hypotheses
- Predict future outcomes
- ...all while accounting from uncertainty

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"All models are wrong, but some are useful."
G.E.P. Box (1987)

Putting the model to the test

- How well does it predict?

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- Will your results hold up in court?

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- How well does it predict?
- Will your results hold up in court?
- Can your results be replicated/reproduced?

# Types of models

- Conceptual
- Physical
- Graphical
- Mathematical
- Statistical

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$$N_{t+1} = N_t + B_t + I_t - D_t - E_t$$

---

$N_t$: population size (state variable) at time $t$
$B_t$: births
$I_t$: immigrants
$D_t$: deaths
$E_t$: emigrants

$$N_{t+1} = N_t + B_t + I_t - D_t - E_t$$

As written, this model implies the following:

- $B$, $I$, $D$, and $E$ are not rates, they are the number of events at time $t$.
- The model is **deterministic**, not **stochastic**
- Time is discrete, not continuous

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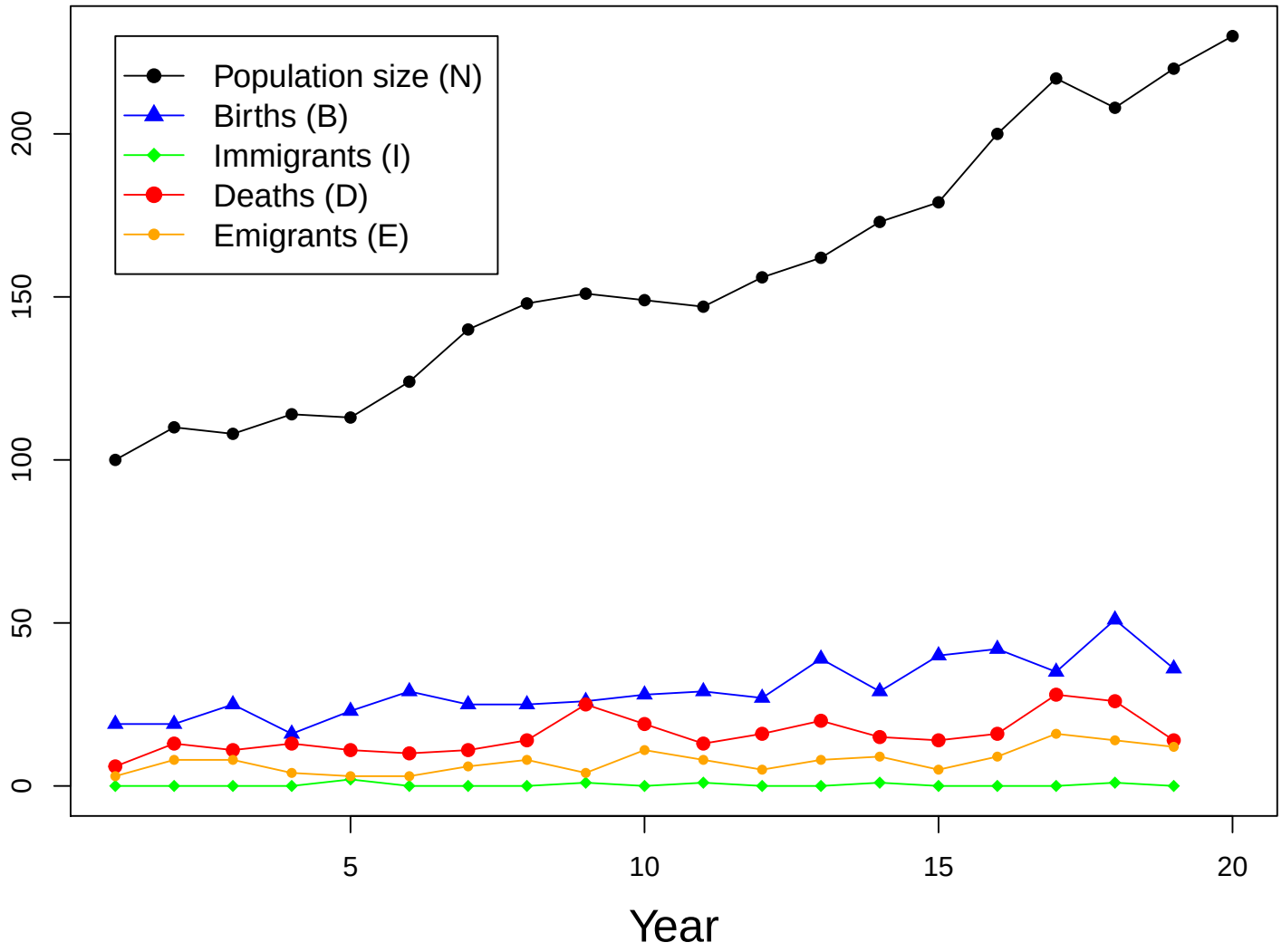

Read the first 3 pages of Chapter 3 in Conroy and Carroll

Expect a quiz next time we meet