



# Don't get Eaten by the Wolf

The diagram illustrates the Hare Population Equation and a birth loop. The equation is shown as:

$$H_{Future} = H_{Current} + r_{Growth} \times H_{Current}$$

Below the equation, the terms are mapped to boxes:

- $H_{Future}$  maps to a pink box labeled "FUTURE HARE POPULATION".
- $H_{Current}$  maps to a yellow box labeled "CURRENT HARE POPULATION".
- $r_{Growth} \times H_{Current}$  maps to a green box labeled "GROWTH RATE TIMES HARE POPULATION".
- The equals sign (=) is represented by a black arrow pointing to the text "=".
- The plus sign (+) is represented by a black arrow pointing to the text "+".

To the right of the equation, a circular loop labeled "Birth" leads to a circle labeled "Hare", representing a feedback loop where the hare population influences its own growth.

| Year | Hare Population             |
|------|-----------------------------|
| 0    | 60                          |
| 1    | $60 + 0.2 \cdot (60) = 72$  |
| 2    | $72 + 0.2 \cdot (72) = 86$  |
| 3    | $86 + 0.2 \cdot (86) = 103$ |

A scatter plot showing the Hare Population over time. The y-axis is labeled 'Hare Population' and ranges from 0 to 120. The x-axis is labeled 'Year' and ranges from 0 to 100. Four data points are plotted at years 0, 1, 2, and 3, showing an increasing trend.

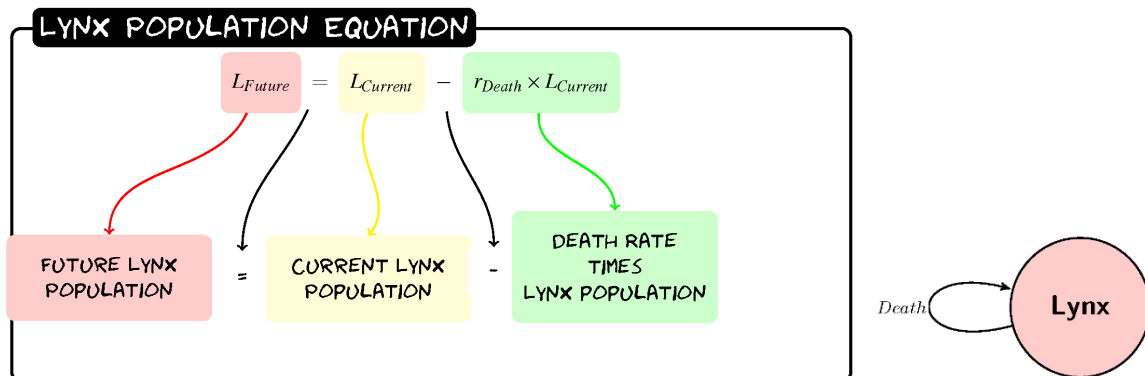
| Year | Hare Population |
|------|-----------------|
| 0    | 60              |
| 1    | 72              |
| 2    | 88              |
| 3    | 108             |

Over 4 Billion



# Lynx

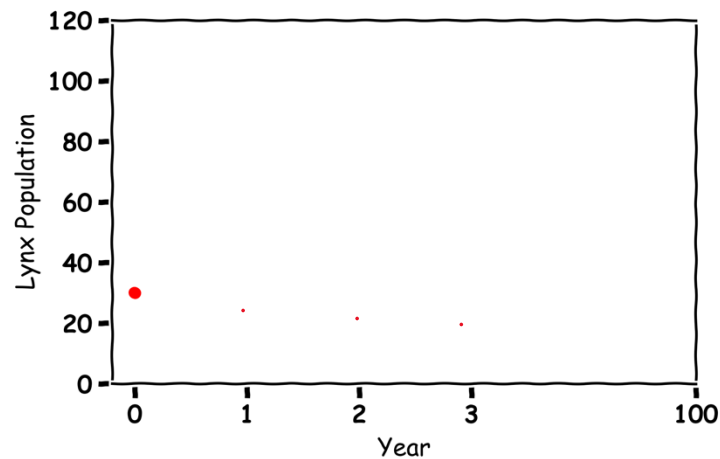
No Prey



Given a population of 30 Lynxes and a death rate of 0.1 what would the population be after three years?

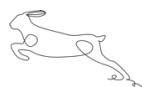
| Year Lynx Population |                             |
|----------------------|-----------------------------|
| 0                    | 30                          |
| 1                    | $30 - 0.1 \times (30) = 27$ |
| 2                    | $27 - 0.1 \times (27) = 24$ |
| 3                    | $24 - 0.1 \times (24) = 22$ |

Sketch the Graph.



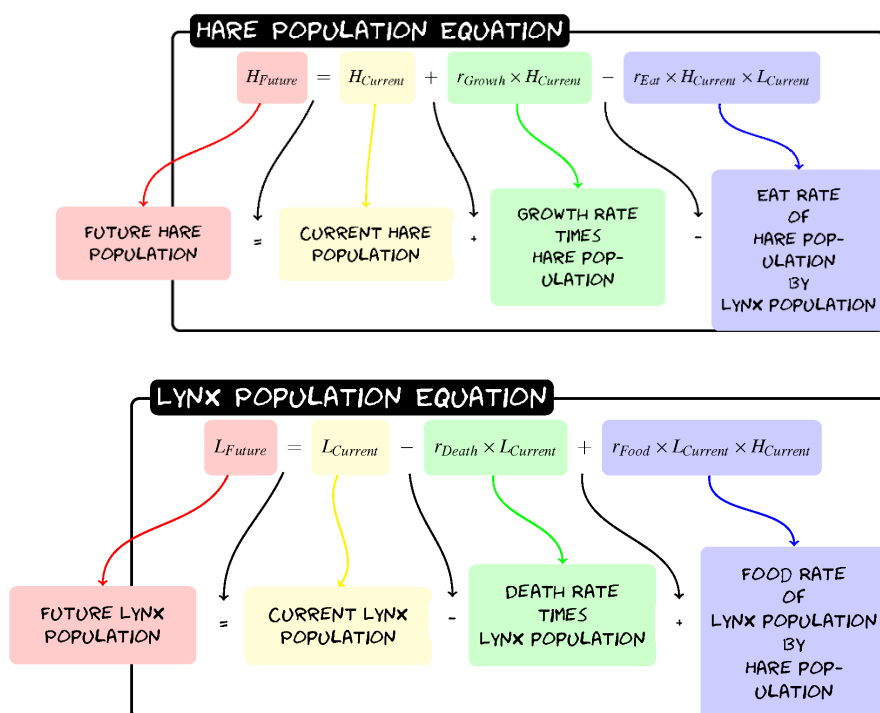
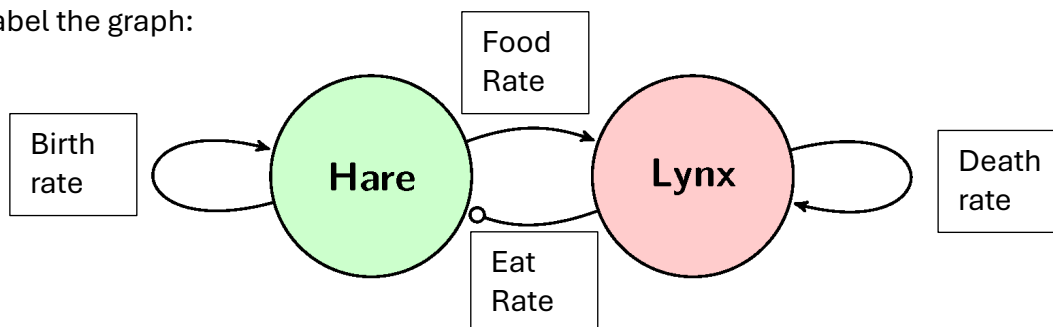
Guess what would happen in 100 years?

All Dead



## Hares and Lynxes

Label the graph:



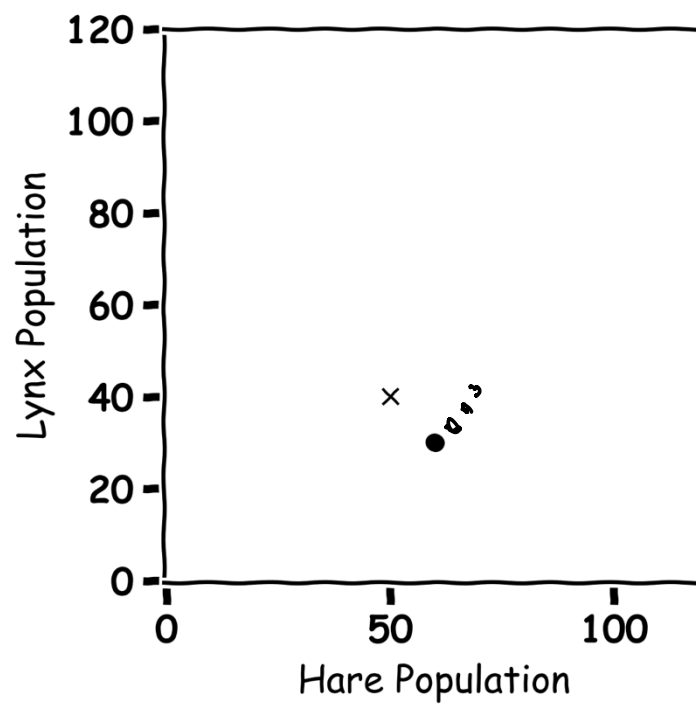
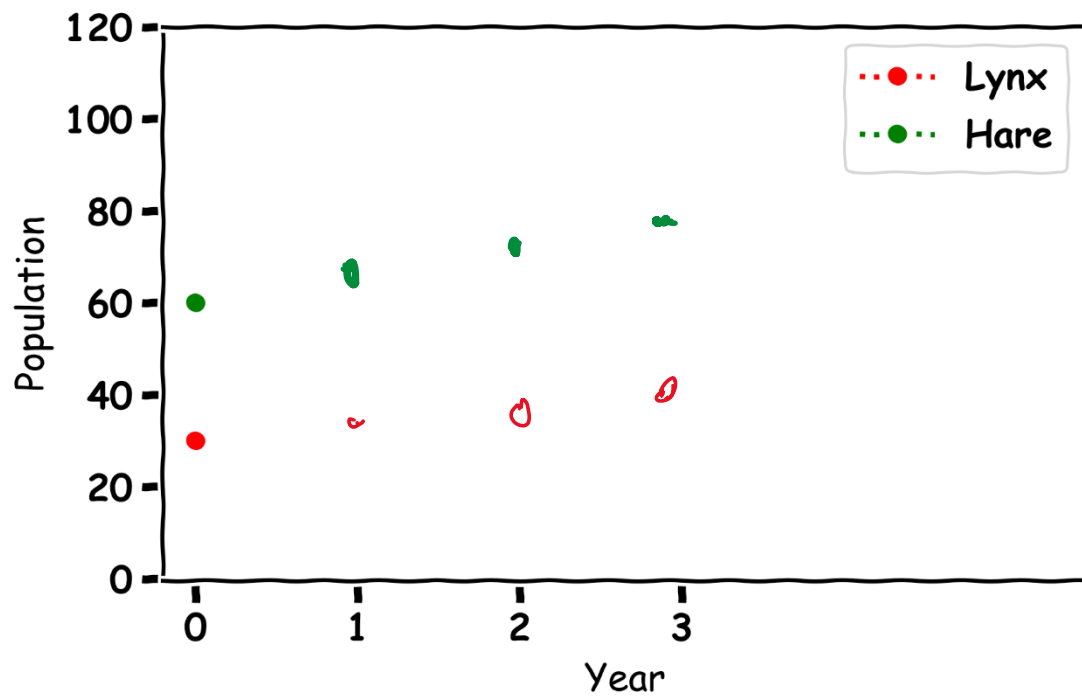
Given a population of 60 Hares and 30 Lynxes with a birth rate of .2, a death rate of 0.1, a eat rate of 0.005 and a food rate of 0.002 what would the populations be after three years?

| Hare  | Value | Lynx  | Value |
|-------|-------|-------|-------|
| Birth | 0.2   | Death | 0.1   |
| Eat   | 0.005 | Food  | 0.002 |

| Year | Hare Population                                             | Lynx Population                                             |
|------|-------------------------------------------------------------|-------------------------------------------------------------|
| 0    | 60                                                          | 30                                                          |
| 1    | $60 + 0.2 \times (60) - 0.005 \times (60) \times (30) = 63$ | $30 - 0.1 \times (30) + 0.002 \times (30) \times (60) = 31$ |
| 2    | $63 + 0.2 \times (63) - 0.005 \times (63) \times (31) = 66$ | $31 - 0.1 \times (31) + 0.002 \times (31) \times (63) = 31$ |
| 3    | $66 + 0.2 \times (66) - 0.005 \times (66) \times (31) = 69$ | $31 - 0.1 \times (31) + 0.002 \times (31) \times (66) = 32$ |



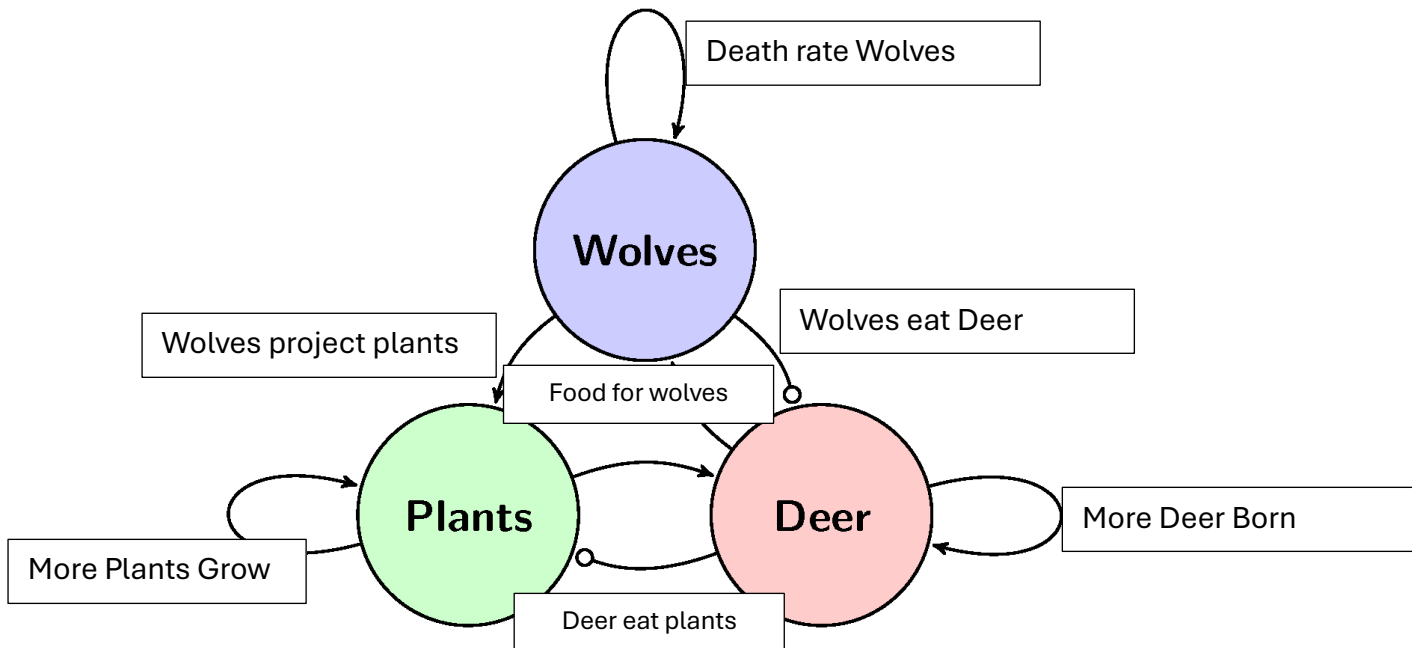
Sketch the graph:



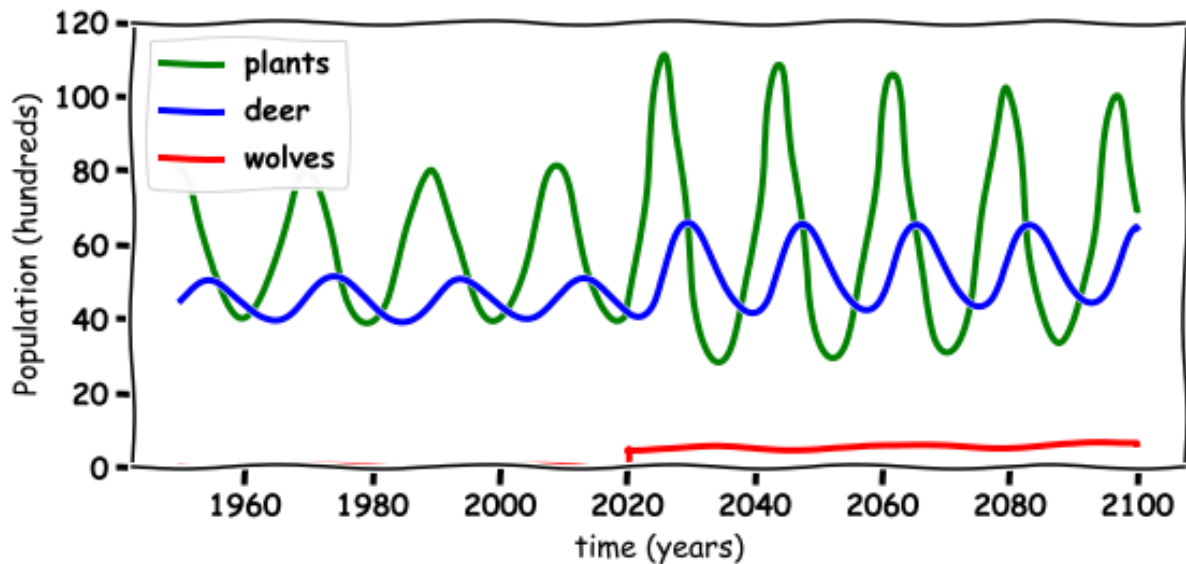


# Don't get Eaten by the Wolf

Label the graph



Describe what is happening in the below graph:



When the Wolves were reintroduced, they scared the deer from the river which helped the plants grow. This also made more food for the deer.



## Discussion Questions

1. What happened to the environment when the wolves are re-introduced?
2. What happened to the wolf population when they are re-introduced?
3. What happened to the deer population when the wolves are re-introduced?
4. Do you think the wolves should have been re-introduced in Ireland?
5. What else could you model with these Equations?