Assignment 5 - Dynamic Models

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Background

Methods

```
# Libraries
library(tidyverse)
library(janitor)
library(scales)
library(here)
library(deSolve)

# Custom Functions
source(here("R","dlogpop.R"))
```

```
# bash function to print the code of our function
cat ./R/dlogpop.R
```

```
## #'  Logistic population growth
## #' @param time time
## #' @param P initial population
## #' @param params$r intrinsic population growth rate
## #' @param params$K carrying capacity of the population
## #' @return derivative of population with time
##
## dlogpop = function(time, P, params) {
##
##   r = params$r
##   K = params$K
##
##   dlogpop = r*P*(1-P/K)
##
##   return(list(dlogpop))
## }
```

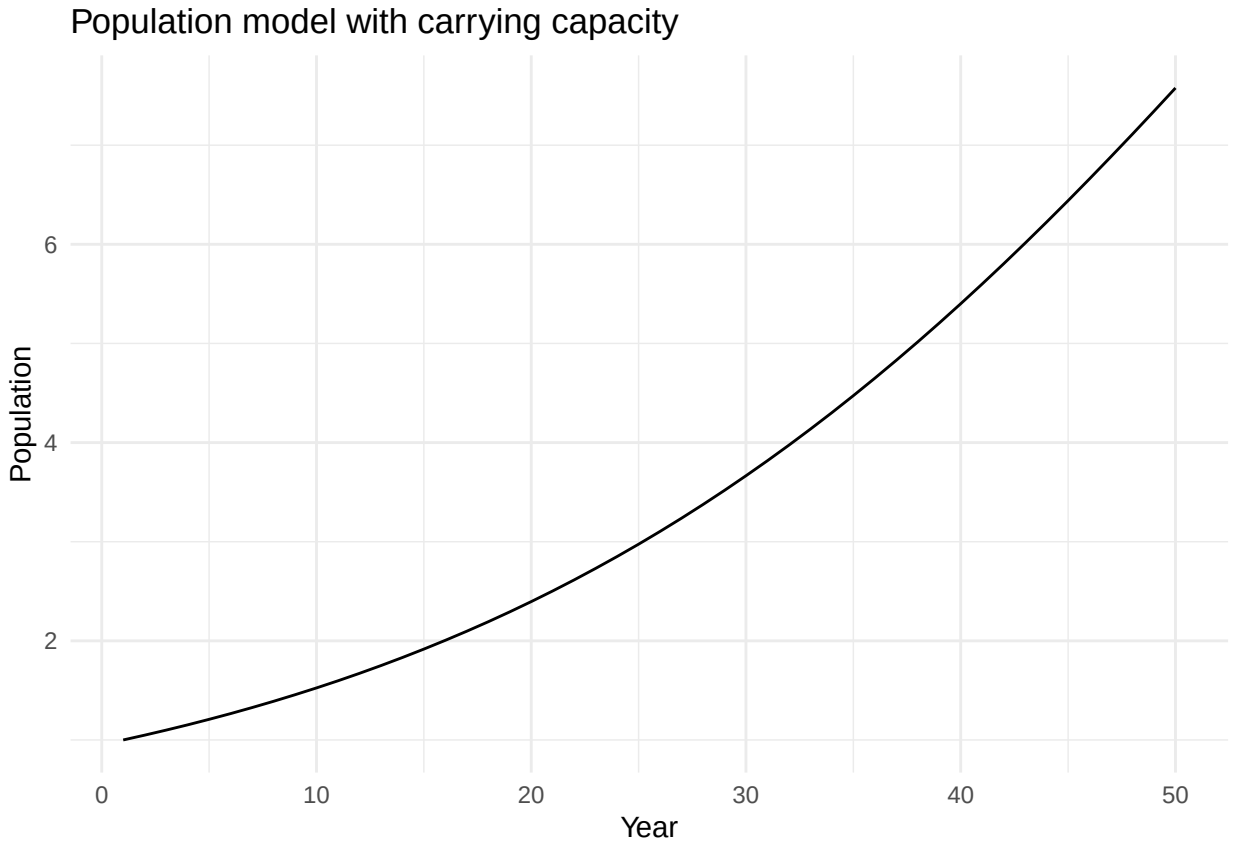
```
# Specification of all required parameters
parms <- list(
  r = 0.05,
  K = 20
)
```

```r
P = 1

time = seq(from = 1, to = 50)
```

```r
# Implementation of the model using ode from deSolver
pop_with_K <- ode(
  y=P,
  times = time,
  func = dlogpop,
  parms = parms
)

# Rename the columns so it is useful
colnames(pop_with_K)=c("time","P")
```

Results

```r
# Plot of the results
ggplot(data = as.data.frame(pop_with_K))+
  geom_line(aes(x=time,y=P))+
  labs(title = "Population model with carrying capacity",
    x = "Year",
    y = "Population") +
    theme_minimal()
```



Discussion