

# Module 4 Assignment 3 Answer Key

EKB

2025-12-02

1.

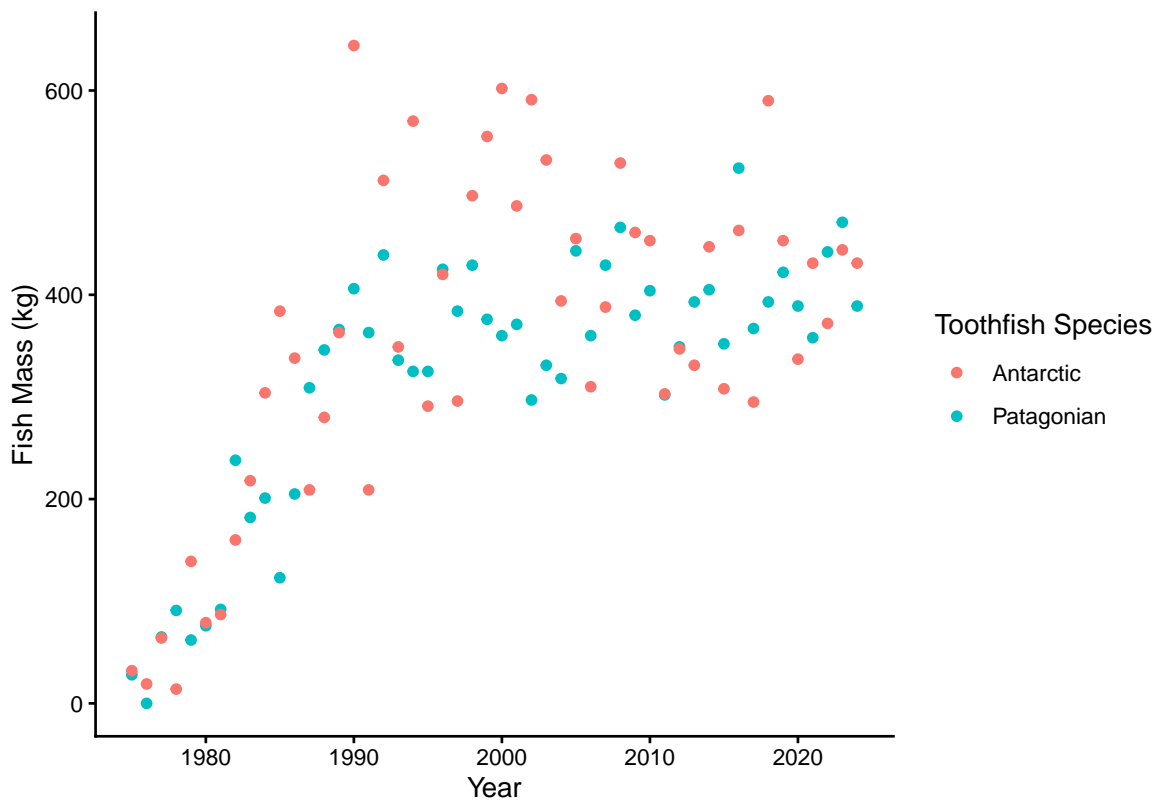
```
## -- Attaching core tidyverse packages ----- tidyverse 2.0.0 --
## v dplyr      1.1.4      v readr      2.1.5
## v forcats    1.0.0      v stringr   1.5.2
## v ggplot2    4.0.0      v tibble    3.3.0
## v lubridate  1.9.4      v tidyr     1.3.1
## v purrr      1.1.0
## -- Conflicts ----- tidyverse_conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()     masks stats::lag()
## i Use the conflicted package (<http://conflicted.r-lib.org/>) to force all conflicts to become errors
## Loading required package: MASS
##
##
## Attaching package: 'MASS'
##
## The following object is masked from 'package:dplyr':
##
##   select
##
##
## 'drc' has been loaded.
##
## Please cite R and 'drc' if used for a publication,
##
## for references type 'citation()' and 'citation('drc')'.
##
##
## Attaching package: 'drc'
##
## The following objects are masked from 'package:stats':
##
##   gaussian, getInitial
```

2.

```
## Rows: 100 Columns: 3
## -- Column specification -----
```

```
## Delimiter: ","
## chr (1): species
## dbl (2): fish_kg, date
##
## i Use `spec()` to retrieve the full column specification for this data.
## i Specify the column types or set `show_col_types = FALSE` to quiet this message.

## # A tibble: 100 x 3
##   species    fish_kg  date
##   <chr>      <dbl> <dbl>
## 1 Patagonian      28  1975
## 2 Patagonian       0  1976
## 3 Patagonian     65  1977
## 4 Patagonian     91  1978
## 5 Patagonian     62  1979
## 6 Patagonian     76  1980
## 7 Patagonian     92  1981
## 8 Patagonian    238  1982
## 9 Patagonian    182  1983
## 10 Patagonian   201  1984
## # i 90 more rows
```



4.

5.

```
## # A tibble: 50 x 3
##   species    fish_kg  date
##   <chr>      <dbl> <dbl>
## 1 Patagonian      28  1975
## 2 Patagonian       0  1976
```

```
## 3 Patagonian      65 1977
## 4 Patagonian      91 1978
## 5 Patagonian      62 1979
## 6 Patagonian      76 1980
## 7 Patagonian      92 1981
## 8 Patagonian     238 1982
## 9 Patagonian     182 1983
## 10 Patagonian     201 1984
## # i 40 more rows
```

```
## # A tibble: 50 x 3
##   species  fish_kg  date
##   <chr>      <dbl> <dbl>
## 1 Antarctic    32 1975
## 2 Antarctic    19 1976
## 3 Antarctic    64 1977
## 4 Antarctic    14 1978
## 5 Antarctic   139 1979
## 6 Antarctic    79 1980
## 7 Antarctic    87 1981
## 8 Antarctic   160 1982
## 9 Antarctic   218 1983
## 10 Antarctic   304 1984
## # i 40 more rows
```

7.

```
##
## A 'drc' model.
##
## Call:
## drm(formula = fish_kg ~ date, data = pat, fct = LL.4())
##
## Coefficients:
## b:(Intercept)  c:(Intercept)  d:(Intercept)  e:(Intercept)
##      -628.9632      -0.6173       391.1327      1983.6795
```

8.

```
##
## A 'drc' model.
##
## Call:
## drm(formula = fish_kg ~ date, data = ant, fct = LL.4())
##
## Coefficients:
## b:(Intercept)  c:(Intercept)  d:(Intercept)  e:(Intercept)
##      -719.317      -1.875       430.739      1983.039
```

10.

```
## # A tibble: 50 x 4
##   species  fish_kg  date predicted_values
##   <chr>      <dbl> <dbl>          <dbl>
## 1 Patagonian    28 1975          22.7
## 2 Patagonian     0 1976          30.8
## 3 Patagonian    65 1977          41.3
```

```
## 4 Patagonian      91 1978      54.8
## 5 Patagonian      62 1979      71.7
## 6 Patagonian      76 1980      92.3
## 7 Patagonian      92 1981     117.
## 8 Patagonian     238 1982     144.
## 9 Patagonian     182 1983     174.
## 10 Patagonian    201 1984     205.
```

```
## # i 40 more rows
```

```
## # A tibble: 50 x 4
```

```
##   species  fish_kg  date predicted_values
##   <chr>      <dbl> <dbl>          <dbl>
## 1 Antarctic    32 1975          20.2
## 2 Antarctic    19 1976          29.2
## 3 Antarctic    64 1977          41.5
## 4 Antarctic    14 1978          57.9
## 5 Antarctic   139 1979          79.2
## 6 Antarctic    79 1980         106.
## 7 Antarctic    87 1981         138.
## 8 Antarctic   160 1982         174.
## 9 Antarctic   218 1983         213.
## 10 Antarctic  304 1984         252.
```

```
## # i 40 more rows
```

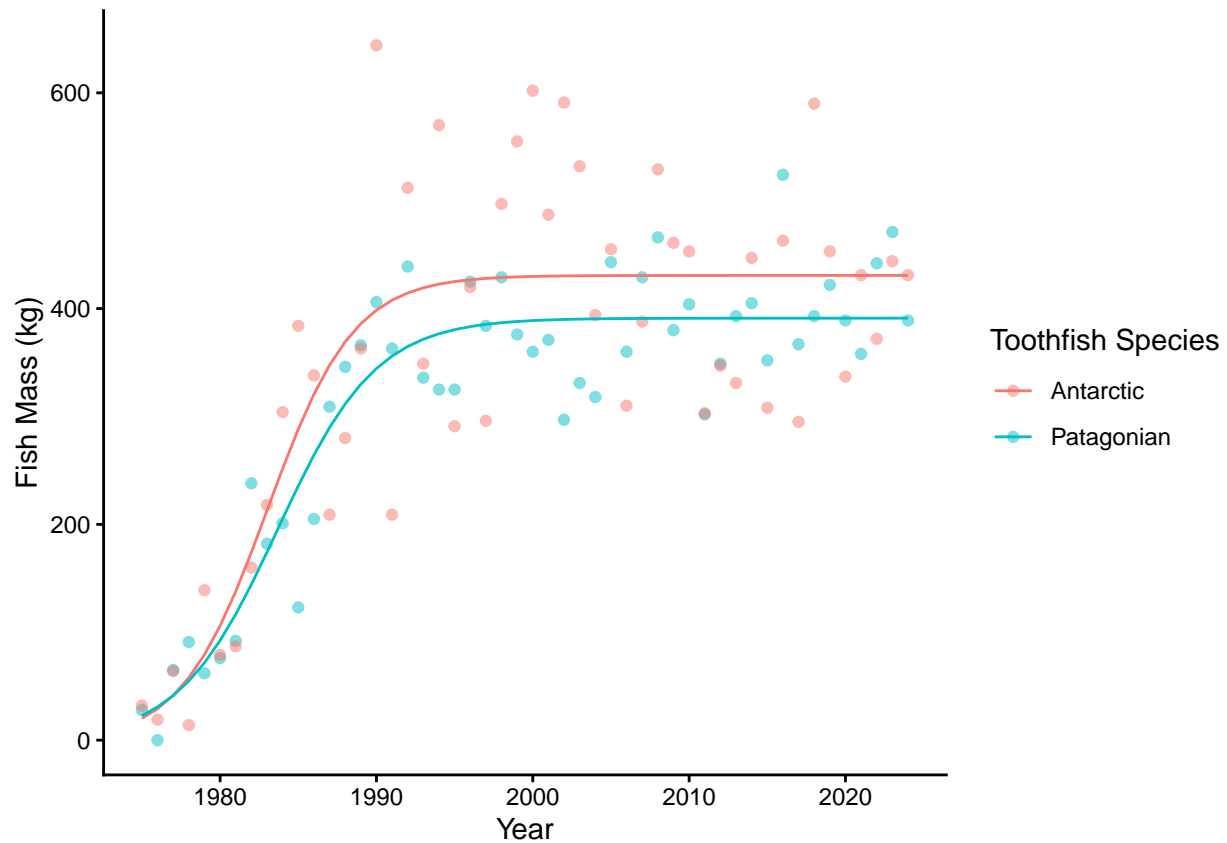
11.

```
## # A tibble: 100 x 4
```

```
##   species  fish_kg  date predicted_values
##   <chr>      <dbl> <dbl>          <dbl>
## 1 Patagonian    28 1975          22.7
## 2 Patagonian     0 1976          30.8
## 3 Patagonian    65 1977          41.3
## 4 Patagonian    91 1978          54.8
## 5 Patagonian    62 1979          71.7
## 6 Patagonian    76 1980          92.3
## 7 Patagonian    92 1981         117.
## 8 Patagonian   238 1982         144.
## 9 Patagonian   182 1983         174.
## 10 Patagonian  201 1984         205.
```

```
## # i 90 more rows
```

12.



13.

```
## # A tibble: 60 x 4
##   species    fish_kg  date predicted_values
##   <chr>      <dbl> <dbl>          <dbl>
## 1 Patagonian    325  1995          381.
## 2 Patagonian    425  1996          383.
## 3 Patagonian    384  1997          385.
## 4 Patagonian    429  1998          387.
## 5 Patagonian    376  1999          388.
## 6 Patagonian    360  2000          389.
## 7 Patagonian    371  2001          389.
## 8 Patagonian    297  2002          390.
## 9 Patagonian    331  2003          390.
## 10 Patagonian   318  2004          390.
## # i 50 more rows
```

14.

```
## # A tibble: 2 x 3
##   species    avg_fish_kg stdev_fish_kg
##   <chr>      <dbl>      <dbl>
## 1 Antarctic    427.        94.9
## 2 Patagonian   388.        51.8
```

16.

```
##
## Welch Two Sample t-test
```

```
##
## data: fish_kg by species
## t = 1.9562, df = 44.877, p-value = 0.05669
## alternative hypothesis: true difference in means between group Antarctic and group Patagonian is not
## 95 percent confidence interval:
## -1.147373 78.414040
## sample estimates:
## mean in group Antarctic mean in group Patagonian
##          427.1000          388.4667
```