Lab Exercises Week 05

Alison Lawyer

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```
# keep this chunk in all your RMarkdown scripts
knitr::opts_chunk$set(echo = TRUE)
knitr::opts_chunk$set(tidy.opts = list(width.cutoff = 60), tidy = TRUE)
```

```
# List required packages
library(tidyverse)
```

```
## -- 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   1.5.1
## v ggplot2   3.5.1     v tibble    3.2.1
## v lubridate 1.9.3     v tidyr     1.3.1
## v purrr     1.0.2
## -- 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
```

LAB EXERCISES

In this week's lab, you will practicing application of probability distributions and z-scores to probabilistic problems in ecology and evolutionary biology.

Exercise 1

In a study of a bird population, it is observed that 20% of nests contain 5 or more eggs. If you randomly select 8 nests, what is the probability that at least 3 of them have 5 or more eggs?

```
pbinom(2, size = 8, prob = 0.2, lower.tail = FALSE)
```

```
## [1] 0.2030822
```

Exercise 2

In a field study, it is observed that 30% of a certain species of plants bear fruit. If you randomly select 15 plants, what is the probability that 6 or fewer of them bear fruit?

```r
pbinom(6, size = 15, prob = 0.3)
```

```
## [1] 0.8688574
```

Exercise 3

In a study of fish populations, the lengths of fish are normally distributed with a mean of 20 cm and a standard deviation of 4 cm. Calculate the z-score for a fish with a length of 26 cm.

```r
fish_mean <- 20
fish_sd <- 4

fish_z_score <- (26 - fish_mean)/fish_sd
```

Exercise 4

In a study of tree heights, you have data from two different forests. Forest X has a mean tree height of 25 meters with a standard deviation of 5 meters, while Forest Y has a mean tree height of 23 meters with a standard deviation of 30 meters.

A tree in Forest X has a height of 26 meters, and a tree in Forest Y has a height of 28 meters. Calculate and compare the z-scores for these two trees. Discuss the implications of the z-scores in the context of the widely differing standard deviations.

```r
x_tree_mean <- 25
x_tree_sd <- 5
y_tree_mean <- 23
y_tree_sd <- 30

x_z_score <- (26 - x_tree_mean)/x_tree_sd
y_z_score <- (28 - y_tree_mean)/y_tree_sd
```

Answer: