**Class 17 Worksheet**

**Part 1: Change the reference level**

Copy and paste the R code you used to create the msleep3 data set below. This should be no more than 3 lines of code. Do not paste the output.

msleep3 <- msleep2 %>% mutate(conservation\_cat2 = relevel(conservation\_cat, ref=”domesticated”))

*MLR\_mammals <- lm(sleep\_total ~ brainwt + conservation\_cat2 + brainwt\*conservation\_cat2, msleep3)*

*summary(MLR\_mammals)*

**Part 2: An interaction model**

Average time slept = -10.9 - (13.1\*brainwt) + (2.6\*hc) + (1.5\*lc) - (40.3\*brainwt\*hc) + (465\*brainwt\*lc)

Answer each of the following questions about the estimated model above. Make sure you show all your work!

1. What is the average time slept for an animal with a brain that weighs 0.04 kg and is in the highest concern category?

-10.9 - (13.1\*0.04) + 2.6 - (40.3\*0.04)

1. What is the average time slept for an animal with a brain that weighs 0.04 kg and is domesticated?

-10.9 - (13.1\*0.04)

1. What is the average difference in the time slept between animals in the highest concern category and animals in the least concern category?

[-10.9 - (13.1\*brainwt) + 2.6 - (40.3\*brainwt)] - [-10.9 - (13.1\*brainwt) + 1.5 + (465\*brainwt)] = 2.6 - 1.5 + (-40.3 - 465)\*brainwt = 1.1 + 424.7\*brainwt, so the average difference in time slept depends on the value of the variable brainwt.

1. What is the average effect of brain weight on time slept?

The effect of brain weight depends on the endangered status of the animals. For animals of highest concern, the average effect is: 13.1 - 40.3

For animals of least concern, the average effect is: 13.1 + 465

And for domesticated animals, the average effect is: 13.1

1. What is the average effect on time slept for mammals of type hc?

The effect of being in the highest concern category depends on the brain weight of the animals: -10.9 + 2.6 - (40.3\*brainwt)

1. What is the average effect on time slept for mammals of type lc?

The effect of being in the least concern category depends on the brain weight of the animals: -10.9 + 1.5 + (465\*brainwt)

**Part 3: A main effects model**

Fit a MLR without an interaction term and answer the following questions

1. What is the estimated regression equation?

Average time slept = 11.2 - (14.8\*brainwt) + (0.1\*hc) + (2.7\*lc)

1. What is the average effect of brain weight on time slept?

For every one kg increase in brain weight, the average time slept decreases by 14.8 hours.

1. What is the average effect on time slept for mammals of type hc?

The average time slept for mammals in the highest concern category is 11.2+0.1

1. What is the average effect on time slept for mammals of type lc?

The average time slept for mammals in the least concern category is 11.2+2.7