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Reading Questions 12  
I worked alone

**Q1 (2 pts.):**

Say we are running an experiment on cardón cactus plants in the greenhouse. Cardóns, native to the Baja CA Peninsula, are trioecious – there exist female, male, and hermaphroditic plants. We want to understand what variables impact nectar production, a major food source for migrating lesser long-nosed bats. There are many variables in the natural environment that might effect nectar production– amount of sunlight, aspect of slope, elevation, water availability, soil composition, latitude, etc. that we are trying to replicate in the greenhouse with treatments – so we are testing water application, temperature, amount of shade/sun, and adding nitrogen to the soils for all three sexes.

Now, there is a temptation to combine all the treatments in our model to investigate what combination of predictors, at what amounts, leads to the strongest relationship with nectar production. We have a plethora of continuous variables and categorical (plant sex, for example) that we could try to combine to explain the maximum amount of variability. However, this approach – a complex model – may actually make understanding the basic biology far more challenging than it needs to be. If we can identify just a couple of strong relationships – say water availability and plant sex – with nectar production, we have both a more interesting, clear story with easily interpretable coefficients, and potentially more applicable results.

**Q2 – B**

**Q3**

$$-1.7 + 0 \cdot 0.043 + 0 \cdot 0.192 + 0 \cdot -0.027 = -1.7g$$

**Q4**

$$-1.7 + 10 \cdot 0.043 + 30 \cdot 0.192 + 20 \cdot -0.027 = 3.95g$$

I multiplied the slope coefficients by the amount of treatment and added the intercept.

**Q5** Describe the key difference between a simple linear regression and a 1-way analysis of variance.

A simple linear regression has one continuous predictor and one continuous response (ie. weight of bird ~ # of calories eaten). A 1-way ANOVA has a categorical predictor with three or more levels (ie. in the penguin data – three different species) and a continuous response (ie. weight).

**Q6 (1 pt.):** Identify the *deterministic* component(s) of the model equation.

The deterministic components are the intercept ( $\alpha$ ) and the slope coefficient ( $\beta_1$ )

**Q7 (1 pt.):** Identify the *stochastic* component(s) of the model equation.

The stochastic component is the noise  $\epsilon$