**CSUMB 550 Homework 7**

**Bayesian Linear Regression**

**Due Tuesday, December 8, 2015**

1. Multiple linear regression

Elephant seal pup wean mass is thought to be affected by both maternal blubber volume and the number of large storms occurring during lactation. Higher maternal blubber means more energy available to give to the pup. An increased frequency of large storms creates more mom-pup separation leading to less nursing or more energetic cost to the pup for thermoregulation or calling for mom. This analysis is important because global warming is predicted to decrease food availability to female seals, leading to lower blubber volume, and increase the number of large storms along the California coastline. Lower wean mass results in lower survival of pups. You have been given the data to determine the relationship between pup wean mass with maternal blubber volume and the number of large storms. Run the Bayesian analyses and report the results. Use DIC values to determine which dependent variables should be used to predict pup wean mass. Over the next 20 years, maternal blubber volume is predicted to be reduced from N(mean = 110, stdev = 10) to N(mean = 90, stdev = 5). The frequency of the number of larger storms is expected to go from Poisson(1) to Poisson(3). What is the current distribution of pup wean mass and the estimated distribution of wean mass in 20 years?

2. Logistic regression

By Florida law, the state must collect and necropsy every reported Florida manatee carcass. The aim is to determine cause of death and age at death to determine how best to reduce human-induced mortalities. Perinatal mortalities (deaths occurring at or near birth) are treated differently because they are not likely caused by direct human contact but may be an indication of the mother’s health. However, determining the age at death (perinatal vs. later in life) for these small animals is difficult, mostly due to rapid decomposition in the tropical waters and because of the animals’ large surface area to volume ratio. There is a strong need to determine the probability an animal is perinatal based on the carcass length, which is sometimes the only measurement available for a decomposed carcass. Determine the logistic relationship between carcass perinatal status (0 = not a perinatal, 1 = perinatal) and carcass length (cm). Run the Bayesian analyses and report the results. We now have a new carcass that was too decomposed to determine age at death. Given it’s length (145 cm), what is the probability the animal was perinatal?