Homework 10

Due: 4/5/2022 Before Class

The code below is the 'best' model for the data example that we have been running in class. For this assignment, we will be analyzing predictive distributions.

1. Draw from separate prior predictive distributions for the girls and boys. Graph these distributions on a plot with histograms of the actual boy and girl data.
2. Make observations about the differences between the prior predictive distributions and the true data.
3. Write 2-5 sentences about the importance of understanding data when choosing prior distributions.

```
library(R2jags)
mdl <- "
model {
  for (i in 1:44){
    y[i] ~ dnorm(mu[i],1/s2g)
    mu[i] <- b0g[id[i]] + bAgeg[id[i]]*Age[i]
  }
  for (i in 45:108){
    y[i] ~ dnorm(mu[i],1/s2b)
    mu[i] <- b0b[id[i]] + bAgeb[id[i]]*Age[i]
  }
  for (i in 1:11){
    b0g[i] ~ dnorm(mub0g,1/s2intg)
    bAgeg[i] ~ dnorm(mub1g,1/s2slpg)
  }
  for (i in 1:16){
    b0b[i] ~ dnorm(mub0b,1/s2intb)
    bAgeb[i] ~ dnorm(mub1b,1/s2slpb)
  }
  s2g ~ dgamma(2,.25)
  s2b ~ dgamma(2,.25)
  s2intg ~ dgamma(4,.25)
  s2intb ~ dgamma(4,.25)
  s2slpg ~ dgamma(1.1,1)
  s2slpb ~ dgamma(1.1,1)
  mub0g ~ dnorm(0,.001)
  mub0b ~ dnorm(0,.001)
  mub1g ~ dnorm(0,.001)
  mub1b ~ dnorm(0,.001)
}
"
writeLines(mdl,'g4.txt')
y <- growth1$y
Age <- growth1$agez
id <- growth1$id
data.jags <- c('y','Age','id')
```

```
parms <- c('b0g','b0b','bAgeg','bAgeb','mub0g','mub1g','mub0b','mub1b',
           's2b','s2intb','s2slpb','s2g','s2intg','s2slpg')
g4.sim <- jags(data=data.jags,inits=NULL,parameters.to.save = parms,
               model.file = 'g4.txt',n.iter=10000,n.burnin = 2000,
               n.thin = 2,n.chains = 4)
g4.sim
```

4. Draw from the posterior distributions of boys and girls. Graph these distributions on a plot with the actual data as in problem 1.
5. Make observations about the differences between the posterior predictive distributions and the true data.
6. Write 2-5 sentences about the model we are fitting (i.e. what the different parameters are, why we fit them, what difference they make, etc. This is very open-ended, just trying to get you to think hard about what we are modeling.)