

**INSTRUCTIONS:**

- For each answer, include a:
  - summary output table and/or graphs, as appropriate
  - short statement about how you handled assumptions and those outcomes
  - short answer that clearly answers the question, based on the results.
- Use `lm` or `sma` (as appropriate) and AICs (we'll wait to use `glmTMB` or `lme4` later).
- Provide your code in an Appendix, organized so that we can relate it to questions
- Submit a pdf (with your name in the file name).

And a hint: if you use SMA regression and want to use `AICctab`, include this inside the parentheses: `nobs=length(X)` - where `X` is one of the variables, and `length(X)` just gives a count of the number of observations (`nobs`) for `AICctab` to use (this is not needed for `lm`).

1. It's Championship Season in the Bigs! Go Dodgers! So here's a baseball data set, from 2010. `MLB2010.txt` lists batting statistics for every baseball player in the 2010 season. Variables we will use for each batter are:

G = games played	AB = at bats	R = runs scored	H = hits
HR = home runs	OBP = on base percentage	AVG = batting average	

[2 pts] Since scoring runs is the reason for batting, which *single variable* most plausibly predicts runs scored (R) by a batter?

[1 pt] Write out the model (i.e., as an equation using words) for that most plausible variable and report its coefficient of determination.

[2 pts] Graph the data and model, as well as residuals, and discuss how well model assumptions were met.

2. The cod fishery in the North Atlantic is heavily fished, and the variables Recruits, Density, and Fishery are three measures of the North Atlantic cod fishery. Commercial fishing is assigned to mapped zones (Fishery; estimated tons harvested per zone). Each of those zones is evaluated annually for fish density (Density; estimated number of adult fish per 100m<sup>2</sup>) and recruitment (Recruits; estimated number of juvenile fish per 100m<sup>2</sup>).

[2 pts] Which of the two estimates (Density or Fishery) in the data (`fishery.txt`) best predicts Recruits, which can then be used to organize next year's harvest of adults?

[1 pt] What is the model for that most plausible variable and its coefficient of determination?

[2 pts] Provide general recommendations to the National Marine Fisheries Service for cod fishing in the following year. Use graphs and statistical results from the fishery data above to justify your recommendations.