Econ 3040 - Assignment 4: Polynomials, Logs, Interactions

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Due date: December 12th, 2022. Worth 3% of your final grade.
Instructions: Submit your assignment in the "Assignment 4" drop box on UM Learn. Include your name and student number. Do not copy and paste output from `R`. Format your results nicely. Submit the `R` code that you used for each question in your assignment.

Use a version of the CPS dataset from class.

```
cps <- read.csv("https://rtgodwin.com/data/cpsassign.csv")
```

Table 1: Description of the variables in the CPS data set.

ahe	average hourly earnings in dollars
female	dummy variable =1 if worker is female
age	age in years
yrseduc	number of years of education
location	a categorical variable that locates a worker in either the "midwest", "northeast", "south" or "west"

1. Estimate a model with `ahe` as the dependent variable, and all the other variables as regressors, and use a cubic model for both `age` and `yrseduc`. Determine the appropriate degree for the polynomials through a series of tests. Report your tests, and estimate and report your preferred model.

2. Estimate a model where you allow the `female` dummy variable to interact with the age and education variables.

3. What is the effect of `yrseduc` on `ahe` for women vs. men? Consider the cases of a woman vs. a man with 12 years of education, gaining an extra year.

4. Using the following R code to estimate a wage model:

   ```
   cps <- read.csv("http://rtgodwin.com/data/cps1985.csv")
   cps.mod <- lm(log(wage) ~ education + gender + age + experience + gender *
       education, data = cps)
   summary(cps.mod)
   ```

   Test for heteroskedasticity. Use White's heteroskedastic robust standard errors, regardless of the result of the test. What changes when you use White's estimator?