Practice Lab -- Figures and (mock) Experiments.

Note: if it is beginning to take significantly longer than 180 min, I recommend to cut off.

1.) Using the file 02_02_PhD_StatsLect_02_DataAnalysis_MRB.pdf,
    a. read dt.wages ad apply 'data.table'
    b. get basic summary statistics. How many observations, how many variables?
    c. reproduce the data-handling steps shown in the slides (and dt.wages).
2.) Let's do a thought experiment: Using the slide-deck AMethods_NovaPhD_Week_04_ATENT_Matching.pdf and dt.wages, let's pretend, for a moment "south," is a randomly assigned treatment in an experiment.:
    a. Compute a difference-in-means estimator when treatment is "south," and the outcome is wage.
    b. Now focus on race and gender as control variables (in "x") and run a regression estimation of treatment effects
    c. Now try to estimate the regression and account for potentially heterogeneous treatment effects.
        i. Note if you get lost, forget about south, and do it only for race.
    d. Next, try to implement a 2-step fitted regression.
    e. Next, consider that you also want to control for experience.
        i. Can you do a regression estimation of treatment effects?
        ii. Can you account for heterogeneous treatment effects w.r.t. experience?
            1. For both, discuss whether this is possible and how you would do it (or do it). Explain, which of the 3 approaches above you would use, and why.
3.) Lastly, let's worry that "south" is potentially not a great randomly assigned treatment.
    a. Provide up to 3 reasons, why South as RV might be flawed.
    b. Provide up to 3 reasons, why South as RV might be justified. (sketch bullets, don't get philosophical)
    c. Now, let's check the balance in the covariates:
        i. Provide summary statistics for both groups (south=0, south =1) separately. Are the covariates well-balanced? Discuss.
    d. Describe verbally how would you set up a matching strategy? Which factors (variables) do you think will be most important to consider in the matching?
        i. Do you think your matching strategy would work?
        ii. Bonus: feel free to try implementing your suggested strategy.