NAME:_____

Experimental Research: Design, Analysis, and Interpretation
W4368
Spring 2014
In-Class Midterm Exam

This exam reviews concepts from FEDAI Chapters 1-6. At the conclusion of this exam, please turn in this sheet along with your blue exam booklet.

Section I: Briefly define and state the significance of the following terms or phrases. Use formal notation to make your definitions as clear as possible.

1. Randomization inference
2. Covariate adjustment
3. Clustered random assignment
4. The assumption of monotonicity in the context of two-sided noncompliance

Section II: The following table was presented in Chapter 5. The results refer to the New Haven voter mobilization experiment, in which a random subset of the subject pool was assigned to be canvassed, but only some of those assigned to be canvassed were actually canvassed. The outcome is voter turnout.

TABLE 5.2

Voter turnout by experimental group, New Haven voter mobilization experiment

	Treatment group	Control group
Turnout rate among those contacted by canvassers	54.43 (395)	
Turnout rate among those not contacted by canvassers	36.48 (1,050)	37.54 (5,645)
Overall turnout rate	41.38 (1,445)	37.54 (5,645)

Note: Entries are percent voting, with number of observations in parentheses. Sample restricted to households containing a single registered voter.

1. Define a "Complier."
2. Estimate the proportion of Compliers in the subject pool.
3. Show (with algebra) that under the assumption of non-interference and excludability, the CACE is identified in this application.
4. Are non-interference and excludability plausible in this example?
5. Estimate (by hand) the CACE. Provide a substantive interpretation of your estimate.

Section III. A recent experiment tested the effects of sending registered voters in New York City a (nonpartisan) postcard that encouraged them to donate to the candidate of their choice, on the grounds that small donations keep elected officials focused on important policy issues. Randomization was conducted within each of 5 blocks; blocks were created based on voters' expected probability of donating to campaigns in the future. Below is a block-by-block summary of the results. The first table displays the distribution of donations in control and treatment, by block. The next table displays the results of regressions, by block, of donations on treatment. The third table displays the results of inverse-probability weighted regression and the accompanying p-values derived from randomization inference under the sharp null hypothesis of no effect. The last table presents the results of an unweighted regression that controls for blocks. Based on your reading of the tables, answer the following questions:

1. Why would an (unweighted) regression of donations on treatment, ignoring blocking, be a biased estimator of the average treatment effect?
2. Interpret the third table's estimate of the ATE and the accompanying p-value.
3. The block-by-block regressions seem to suggest that the postcard has a significantly negative effect on donations in blocks 1 and 4. The p-values based on robust standard errors are below 0.05. Yet the overall estimate of the ATE using inverse-probability weights is positive. What do you think accounts for this apparent discrepancy?
4. Bonus: The weighted regression presented in table 3 produces an estimated ATE that is different from an unweighted regression (presented in table 4) that controls for blocks by using a dummy variable for each block (except one, which is the intercept). What, specifically, about the two regressions causes them to produce different estimates?

TABLE 1

```
--------------------------------------------------------------------------------
  block control_mean control_sd control_n treatment_mean treatment_sd treatment_n
1   1      0.584        38.8      62315        0.000          0.00          300
2   2      0.804        41.9      30065       16.667        288.68          300
3   3      1.121        48.3      14788        0.833         14.43          300
4   4      2.031        73.2       7727        0.250          4.33          300
5   5      0.784        14.7       4198        8.417        144.34          300
--------------------------------------------------------------------------------
```

TABLE 2

```
----------------------------------------------------------------
                            amount_donated
                 Block 1   Block 2   Block 3   Block 4   Block 5
----------------------------------------------------------------
policy_postcard -0.584***  15.863    -0.287    -1.781**   7.632
                (0.155)   (16.641)  (0.922)   (0.869)   (8.324)
Constant         0.584***  0.804***  1.121***  2.031**   0.784***
                (0.155)   (0.242)   (0.397)   (0.832)   (0.226)
N                62,615    30,365    15,088    8,027     4,498
R2               0.00000   0.001     0.00000   0.00002   0.002
----------------------------------------------------------------
*p < .1; **p < .05; ***p < .01
Robust Standard Errors in Parentheses
----------------------------------------------------------------
```

TABLE 3

```
----------------------------------------------------------------
Estimate from inverse probability weighted regression: 3.82112
Two-sided p-value from randomization inference: 0.0317
----------------------------------------------------------------
```

TABLE 4
Linear regression

```
                                          Number of obs =  120593
                                          F(  5,120587) =    1.22
                                          Prob > F      =  0.2980
                                          R-squared     =  0.0002
                                          Root MSE      =  45.939

--------------------------------------------------------------------------------
               |             Robust
amount_donated |    Coef.   Std. Err.     t    P>|t|    [95% Conf. Interval]
---------------+----------------------------------------------------------------
policy_postcard|  4.165892  3.759707    1.11   0.268   -3.203073    11.53486
      _Iblock_2|  .3585068  .3208548    1.12   0.264   -.2703635     .987377
      _Iblock_3|  .4707502  .4237828    1.11   0.267   -.3598571    1.301358
      _Iblock_4|  1.247713  .8301279    1.50   0.133   -.3793243     2.87475
      _Iblock_5|  .4541807  .5669856    0.80   0.423   -.6571018    1.565463
          _cons|  .5612111  .155826     3.60   0.000    .2557946    .8666276
--------------------------------------------------------------------------------
```