```
clear all
set more off, perm

* set working directory
global dir "C:\Users\Nmath_000\Documents\MI_school\Second Year\675 Applied Econometrics\hw\hw1"

*import data
import delimited using "$dir\LaLonde_1986.csv"

**************
* question 2 *
**************


* create needed variables
gen educ_sq = educ^2
gen black_earn74 = black*earn74
gen const = 1

* store needed variables in locals
*local y earn76
*local x const treat black age educ educ_sq earn74 black_earn74 u74 u75

* use mata
mata:


y = st_data(., "earn78")
x = st_data(., ("const", "treat", "black", "age", "educ", "educ_sq", "earn74","black_earn74", "u74","u75"))

n_row = rows(x)
n_col = cols(x)

b = invsym(cross(x,x))*cross(x,y)

bc = cholinv(cross(x,x))*cross(x,y)

diff = b-bc

diff

my_resid = y - x*b
d = diag(my_resid:*my_resid:*(n_row/(n_row-n_col)))

v = invsym(cross(x, x))*(x' * d * x) * invsym(cross(x, x))

se = sqrt(diagonal(v))

tstat = b :/ se

p_value = 2*ttail(n_row-n_col, abs(tstat))

CI_L = b - (se) * invt(n_row-n_col, .975 )
CI_U = b + (se) * invt(n_row-n_col, .975 )

all_data = b, se, tstat, p_value, CI_L, CI_U
all_data
end

cd "C:\Users\Nmath 000\Documents\Code\courses\econ 675\PS 1 tex\"
mmat2tex all_data using stata_2_5_a_raw.tex , replace

// now run regression
reg earn78 treat black age educ educ_sq earn74 black_earn74 u74 u75, robust

outreg2 using stata 2 5 b.tex

// nice, they match
```

```
69
70  **************
71  * question 3 *
72  **************
73
74  **********
75  * neyman *
76  **********
77
78  sum earn78 if treat==0
79  local N0 = r(N)
80  local mu0 = r(mean)
81  local sd0 = r(sd)
82  local V0 = r(Var)/r(N)
83  local sig_sq0 = r(Var)
84
85  sum earn78 if treat==1
86  local N1 = r(N)
87  local mu1 = r(mean)
88  local sd1 = r(sd)
89  local V1 = r(Var)/r(N)
90  local sig_sq1 = r(Var)
91
92  local tau = `mu1'-`mu0'
93  local v = sqrt(`V1'+`V0')
94  local T = `tau'/`v'
95  local pval = 2*normal(-abs(`T'))
96
97  local mu0 = round(`mu0', .01)
98  local mu1 = round(`mu1', .0001)
99  local sd0 = round(`sd0', .01)
100 local sd1 = round(`sd1', .0001)
101
102 di "`tau'"
103
104
105 local CIlower = `tau' - invnormal(0.975)*`v'
106 local CIupper = `tau' + invnormal(0.975)*`v'
107
108 di "`CIlower'"
109 di "`CIupper'"
110
111
112 **********
113 * fisher *
114 **********
115
116 * Using difference in means estimator
117 permute treat diffmean=(r(mu_2)-r(mu_1)), reps(1999) nowarn: ttest earn78, by(treat)
118 matrix pval = r(p)
119 display "p-val = " pval[1,1]
120
121 * Using KS statistic
122 permute treat ks=r(D), reps(1999) nowarn: ksmirnov earn78, by(treat)
123 matrix pval = r(p)
124 display "p-val = " pval[1,1]
125
126 *************************
127 * 95% confidence interval*
128 *************************
129
130
131 * Infer missing values under the null of constant treatment effect
132 gen     Y1_imputed = earn78
133 replace Y1_imputed = earn78 + `tau' if treat==0
134
135 gen     Y0_imputed = earn78
136 replace Y0_imputed = earn78 - `tau' if treat==1
137
138 * Write program to put into bootstrap function
```

```
program define meandiff, rclass
    summarize   Y1_imputed if treat==1
    local       tau1 = r(mean)
    sum         Y0_imputed if treat==0
    local       tau0 = r(mean)
    return      scalar meandiff = `tau1' - `tau0'
end

* Run bootstrap function using meandiff program
eststo I: bootstrap diff = r(meandiff), reps(1999): meandiff

esttab I using stata 3 2 2 b.tex, mtitle("I") replace

*****************
*power funciton *
*****************

twoway function y= 1 - normal(invnormal(0.975)-x/`v') + normal(-invnormal(0.975)-x/`v'),
range(-5000 5000)


mata: mata clear
mata:


 function myfunc(N, s0, s1, p, tau){

   return(1 - normal(invnormal(0.975)-tau/sqrt(1/N*s1*(1/p)+1/N*s0*(1/(1-p)))) +
       normal(-invnormal(0.975)-tau/sqrt(1/N*s1*(1/p)+1/N*s0*(1/(1-p)))) -0.8)

 }
 s0 =  30072466.58373794
 s1 =  61896056.06715253
    p     = 2/3
   tau   = 1000
   p
   tau
 s0
 s1


  mm_root(x=., &myfunc(), 1000, 1500, 0, 10000, s0,s1, p ,tau)

     x

end
```