```
clear all;

%these are my home and office directories
%cd 'C:\WINDOWS\Desktop\203c';
cd 'C:\Documents and Settings\econhist\Desktop\203c';

%loading data;
data=dlmread('ps4q3_tab.txt','\t');
%data set saved as tab delimited text file;

data=data(1:500,:);
%some junk at the bottom for some reason;

y=data(:,1);
x=data(:,2:5);

[n K]=size(x);

s=ones(1,n);

%need to make these matrices global so function file
%can use them
global x y s;


%options for fmins;
options(14)=10000; %maximum number of iterations;
options(3)=0.000001; %tolerance
options(2)=0.000001; %tolerance
options(1)=1;  %display output



%starting values based on ols;
beta_ols=inv(x'*x)*x'*y;


%I first try some tests to make sure my functions are written correctly
beta_test=beta_ols;

lnl_test=(y'*log(normcdf(x*beta_test))+(s'-y)'*log(s'-normcdf(x*beta_test)))

test=loglike(beta_ols);


%fmins, simplex method, optimization
beta_probit=fmins('loglike',beta_ols,options)

beta_probit=[0.8228;0.9289;-0.8624;0.3941]

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%covariance matrix
%it is of course faster in matlab to use matrix formulations...

for i=1:n
   xb(i)=x(i,:)*beta_probit;
   score(:,i)=-y(i)*(normpdf(xb(i))/normcdf(xb(i)))*x(i,:)'+(1-y(i))*(normpdf(xb(i))/(1-
normcdf(xb(i))))*x(i,:)';
   score_score(:,:,i)=score(:,i)*score(:,i)';
end


est_cov=inv(sum(score_score,3))

std_error=sqrt(diag(est_cov))

%%%%%%test statistic for 3)
```

```
W=((beta_probit(2)+beta_probit(3))^2)/(est_cov(2,2)+est_cov(3,3)+2*est_cov(3,2))



%%%%%%%%%%calculate elasticities at sample means for 4)

beta_diff=beta_probit*normpdf(mean(x(:,1))*beta_probit(1)+mean(x(:,2))*beta_probit(2)+mean
(x(:,3))*beta_probit(3)+mean(x(:,4))*beta_probit(4))

beta_elast=[beta_diff(1)*mean(x(:,1))/mean(y); beta_diff(2)*mean(x(:,2))/mean(y);
beta_diff(3)*mean(x(:,3))/mean(y); beta_diff(4)*mean(x(:,4))/mean(y)]

%%%%%%%%%%new variable for 5)

delta_hat=beta_probit(1)*beta_probit(2)/(beta_probit(3)^2)

tri=[beta_probit(2)/beta_probit(3)^2 beta_probit(1)/beta_probit(3)^2 -2*beta_probit(1)
*beta_probit(2)/beta_probit(3)^3 0];

est_cov_delta=tri*est_cov*tri';

std_error_delta=sqrt(est_cov_delta)



%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%function in seperate m file

function lnl=loglike(beta)

global x y s;

lnl=-(y'*log(normcdf(x*beta))+(s'-y)'*log(s'-normcdf(x*beta)));
```