ECON 512
Homework 5

Pin Sun*

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Problem 1

```
clear;
close all;
dat=load('hw5.mat');
% Moments
m0=1;
m1=0.1;
m2=1+m1^2;
m3=m1^3+3*m1;
m4=m1^4+6*m1^2+3;
m5=m1^5+10*m1^3+15*m1;
mom=[m0,m1,m2,m3,m4,m5];
x0=[ones(1,20)/20, -2.7:0.3:3];
options=optimset('Algorithm','Levenberg-Marquardt');
wbeta = fsolve(@(x)FindNormPointsWeights(x,mom), x0,options);
w=wbeta(1:length(x0)/2);
beta=wbeta((length(x0)/2+1):end);
N=20;
logv=0;
for i=1:N
sumT=0;
for j=1:length(w)
sumT=sumT+...
w(j)*prod((1+exp(-(beta(j)*...
dat.data.X(i,:)))).^(-dat.data.Y(i,:)).*(exp(-(beta(j)*...
dat.data.X(i,:)))/(1+exp(-(beta(j)*...
dat.data.X(i,:)))).^(1-dat.data.Y(i,:)));
end
```

*pxs251@psu.edu

```
logv=logv+log(sumT);
end
logv

Equation solved.

fsolve completed because the vector of function values is near zero
as measured by the default value of the function tolerance, and
the problem appears regular as measured by the gradient.

<stopping criteria details>


logv =

-695.8431
```

Problem 2

```
clear;
close all;
dat=load('hw5.mat');
rng(1234);
beta=randn(100,1)+0.1*ones(100,1);
beta=beta';
sumT=0;
N=20;
logv=0;
for i=1:N
sumT=0;
for j=1:length(beta)
sumT=sumT+...
1/length(beta)*prod((1+exp(-(beta(j)*...
dat.data.X(i,:)))).^(-dat.data.Y(i,:)).*(exp(-(beta(j)*...
dat.data.X(i,:)))/(1+exp(-(beta(j)*...
dat.data.X(i,:)))).^(1-dat.data.Y(i,:)));
end
logv=logv+log(sumT);
end
logv

logv =

-695.4257
```

Problem 3

```
clear;
close all;
para0=[0.1,1,0];
A=[0,-1,0];
b=0;
[para1,nlog1]=fmincon(@(x)optgq(x),para0,A,b);
[para2,nlog2]=fmincon(@(x)optmc(x),para0,A,b);
para1

para1 =

0.0789    2.0721   -0.4493

>> para2

para2 =

1.8138    0.0067   -0.2885

>> logv1=-2000*nlog1

logv1 =

-425.1371

>> logv2=-2000*nlog2

logv2 =

-394.8150
```

Problem 4

```
clear;
close all;
para0=[0.1,0.1,0.1,0.1,0.2,0.3];
[para,nlog]=fminsearch(@(x)optmcfor4(x),para0);
beta0=para(1)
beta1=para(2)
sigma_beta=abs(para(3))
sigma_u=sqrt(para(4)^2+para(5)^2)
sigma_ubeta=para(3)*para(4)
gamma=para(6)
logval=-nlog*2000
beta0 =

22.6817


beta1 =

-6.1896


sigma_beta =

5.1673


sigma_u =

72.4101

sigma_ubeta =
-231.1438
gamma =
3.0598
logval =
-145.9163
```

Problem 5

	β_0	σ_β	γ	Log-likelihood Value
Guassian Quadrature	0.0789	2.0721	-0.4493	-425.173
Monte Carlo	1.8138	0.0067	-0.2885	-394.8150

Table 1: GQ and MC Methods Estimation

	β_0	u_0	σ_β	γ	σ_u	$\sigma_{\beta u}$	Log-likelihood Value
Monte Carlo	22.6817	-6.1896	5.1673	3.0598	72.4101	-231.1438	-145.9163

Table 2: MC Method Estimation