Homework 8

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1.

(a) mean\_dt = 582.8 3.096 ; cc0 = 0.6613

(b)

|  |  |  |  |
| --- | --- | --- | --- |
| B | 25 | 50 | 100 |
| Sd\_mean | 0.1362 | 0.1561 | 0.1304 |
| Sd\_cc | (24.21,0.1583) | (32.5119,0.1852) | (33.48,0.1781) |
| B | 200 | 500 | 1000 |
| Sd\_mean | 0.1263 | 0.1360 | 0.1389 |
| Sd\_cc | (32.33,0.1935) | (32.02,0.1680) | (30.6250,0.1726) |

(c)



Figure 1 histogram of bootstrap replicates of correlation coefficients

Matlab Code:

%Homework 8

%problem 1

clear all;

close all;

load('hw8\_1\_data.mat');

%random selec 15;

ind = floor(rand(1,15)\*length(X));

%new data

Data = X(ind(1,:),:);

clear ind;

%means and correlation coefficient;

mean\_dt = mean(Data);

temp = corrcoef (Data(:,1), Data(:,2));

cc0 = temp(1, 2);

B = 2000;

%bootstrap

bx = zeros(15,2,B);

for i = 1:B

ind = randsample(15,15,'true');

bx(:,:,i) = Data(ind,:);

end;

%coef

for i = 1:B

temp = corrcoef(bx(:,1,i),bx(:,2,i));

cc(i) = temp(1,2);

end;

%se of coef

sdcc = std(cc)

%mean

btmean = mean(bx);

semean\_lsat = std(bx(1,1,:))

semean\_gpa = std(bx(1,2,:))

hist(cc)

Problem 2

(a)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| B | 25 | 100 | 200 | 500 | 1000 | 2000 |
| Se\_b | 0.9424 | 1.2091 | 1.1572 | 1.2018 | 1.2120 | 1.2278 |

(b)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| B | 25 | 100 | 200 | 500 | 1000 | 2000 |
| Est\_var | 0.2114 | 0.0851 | 0.0522 | 0.0331 | 0.0285 | 0.0186 |

Matlab Code:

%Homework 8

%Problem 2

clear all;

close all;

x = [1 2 3.5 4 7 7.3 8.6 12.4 13.8 18.1];

x\_sort = sort(x);

x\_trimmed = x\_sort(3:8);

mean\_trim = mean(x\_trimmed);

%do bootstrap

for t=1:50

B = 2000;

bx = zeros(1,6,B);

for i=1:B

ind = randsample(6,6,'true');

bx(1,:,i) = x\_trimmed(1,ind);

end;

%estimate the theta;

for i=1:B

bt\_theta(i) = mean(bx(1,:,i));

end;

%sd

bt\_se(t) = std(bt\_theta);

end;

std(bt\_se)

Problem 3



N = 10 n = 20



N = 100

Matlab code:

%answer for hm8 problem 3

clear all;

close all;

n = 100;

x = randn(1,n);

theta = mean(x);

%do bootstrap

B = 2000;

for t =1:50

bx = zeros(1,n,B);

for i=1:B

ind = randsample(n,n,'true');

bx(1,:,i) = x(1,ind);

end;

%estimate the theta;

for i=1:B

bt\_theta(i) = median(bx(1,:,i));

end;

biases(t) = mean(bt\_theta)-theta;

end;

hist(biases);

axis([-0.015 0.015])