Stat13 Homework 5

http://www.stat.ucla.edu/~dinov/courses_students.html

Suggested Solutions

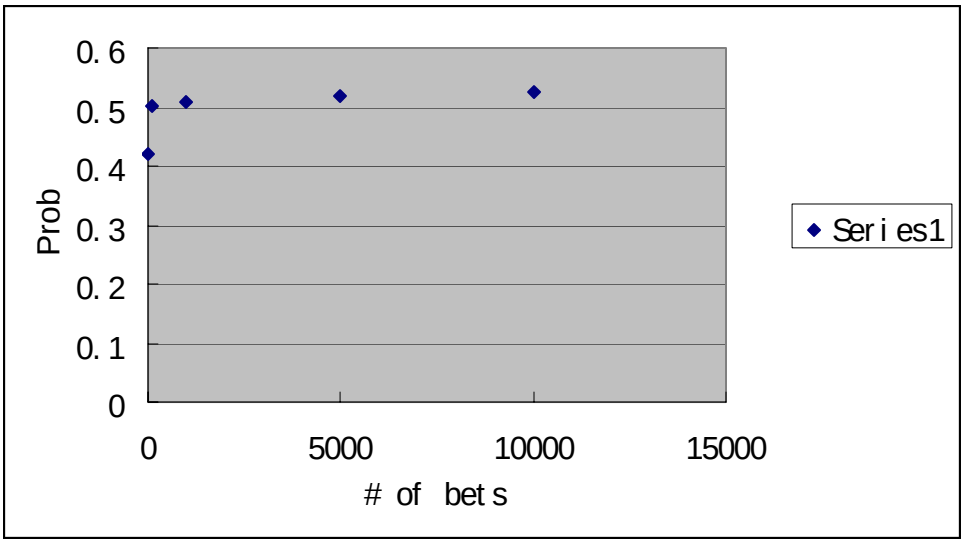
HW_5_1 <20 points>

(1) <4 points>
E(X)=-5*0.581+5*0.346+10*0.064+60*0.009=0.005 <1 point>
SD(X)=sqrt((-5-0.005)^2*0.581+(5-0.005)^2*0.346+(10-0.005)^2*0.064+
(60-0.005)^2*0.009)=7.872419 <2 points>

Prob(positive return in a single bet)=1-0.581=0.419 <1 point>

(2) <4 points>
E(X_bar)=E(X)=0.005 <1 point>
SE(X_bar)=SD(X)/sqrt(100)=0.787 <1 point>
X_bar is normally distributed, based on Central Limit Theorem. <1 point>
P(X_bar>0)=P(z > (0-0.005)/0.787)=P(z >- 0.00635)=1-(1-0.5025)=0.5025 <1 point>
(3) <9 points>
For 1000 bets:
E(X_bar)=0.005
SE(X_bar)=0.2489
P(X_bar > 0)=P(z >-0.02)=0.508 <3 points>
For 5000 bets:
E(X_bar)=0.005
SE(X_bar)=0.1113
P(X_bar > 0)=P(z >-0.0449)=0.5179 <3 points>
For 10000 bets:
E(X_bar)=0.005
SE(X_bar)=0.0787
P(X_bar > 0)=P(z >-0.0635)=0.5253 <3 points>

(4) <3 points>
<2 points for the scatter plot>
The higher the number of independent bets, the MORE likely to make a net gain. <1 point>



HW_5_2 <8 points>
(1) <2 points>
SE(X1_bar – X2_bar)=
sqrt(sd^2(X1)/n1+sd^2(X2)/n2)=sqrt(1.87*1.87/40+1.51*1.51/58)=0.355998
(2) <2 points>
E(X1_bar – X2_bar)=m1-m2=1.8<1 point>
Two-standard-error interval: [1.8-2*0.356, 1.8+2*0.356] = [1.088, 2.512] <1 point>
(3) <4 points>
According to the study:
The difference between the mean of the two groups is normally distributed with mean of 1.8 and standard error of 0.356. The two standard error interval is totally above 0. It is significant that group one (sexual content) has a higher mean of remembering than group two (general audience content). The result of the study can be summarized as: Sexual content ads are more likely to be remembered, at least in the student-aged population.
HW_5_3 <12 points>
(1) <3 points, 1 point each>
one sample:
mean=E(X)=6.21
s.d.=sd(X)=1.3
four sample:
mean=E(X)=6.21
s.d.=sd(X)/2=0.65
16 sample:
mean=E(X)=6.21
s.d.=sd(X)/4=0.325
(2) <2 point>
They differ in standard deviation. Because with larger sample, variance of single units tend to be averaged out. The bigger the sample size, the smaller the standard error.
(3) <7 points>
Y=1.3X-1.3 <1 point>
E(Y)=1.3*E(X)-1.3=6.773 <1 point>

SD(Y)=1.3*SD(X)=1.69 <1 point>
E(X1+X2+X3+Y1+Y2+Y3+Y4+Y5)
=E(X1)+E(X2)+E(X3)+E(Y1)+E(Y2)+E(Y3)+E(Y4)+E(Y5)
=3*6.21+5*6.773
=52.495 <2 points>
SD(X1+X2+X3+Y1+Y2+Y3+Y4+Y5)
=sqrt(sd(X1)+^2+sd(X2)^2+sd(X3)^2+sd(Y1)^2+sd(Y2)^2+sd(Y3)^2+sd(Y4)^2+sd(Y5)
^2)
=sqrt(3*1.3^2+5*1.69^2)
=4.39892 <2 points>

HW_5_4 <10 points>
Omitted here.