**CBA: Practice Problem Set 5**

**Topics: Confidence Intervals for Proportions**

1. The Java computer language, developed by Sun Microsystems, has the advantage that its programs can run on types of hardware ranging from mainframe computers all the way down to handheld computing devices or even smart phones. A test of 100 randomly selected programmers revealed that 71 preferred Java to their other most used computer languages. Construct a 95% confidence interval for the proportion of all programmers in the population from which the sample was selected who prefer Java.

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n = 100

x = the number of programmers preferred Java in the sample = 71

p'=x/n=0.71

p′ = 0.71 is the sample proportion; this is the point estimate of the population proportion.

q′ = 1 – p′ = 1 – 0.71 = 0.29

Since the requested confidence level is CL = 0.95, then α = 1 – CL = 1 – 0.95 = 0.05

alpha/2=0.025

Then Z(alpha/2)=1.96

The confidence interval for the true binomial population proportion is

p'-Z(alpha)sqrt(p'\*q'/n) <= p <= p'+Z(alpha)sqrt(p'\*q'/n)

Hence, confidence interval is : 0.62106 <= p <= 0.79894

With 95% confidence, it can be concluded that between 62.1% and 79.9% of all programmers prefer Java

1. A small British computer-game firm, Eidos Interactive PLC, stunned the U.S.- and Japan-dominated market for computer games when it introduced Lara Croft, an Indiana Jones-like adventuress. The successful product took two years to develop. One problem was whether Lara should have a swinging ponytail, which was decided after taking a poll. If in a random sample of 200 computer-game enthusiasts, 161 thought she should have a swinging ponytail (a computer programmer’s nightmare to design), construct a 95% confidence interval for the proportion of enthusiasts who would like here to have a swinging ponytail, in this market. If the decision to incur the high additional programming cost was to be made if *p>* 0.90, was the right decision made (when Eidos went ahead with the ponytail)? - Yes

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n = 200

x = the number of enthusiasts who would like Lara to have a swinging ponytail = 161

p'=x/n=0.805

p′ = 0.805 is the sample proportion; this is the point estimate of the population proportion.

q′ = 1 – p′ = 1 – 0.805 = 0.195

Since the requested confidence level is CL = 0.95, then α = 1 – CL = 1 – 0.95 = 0.05

alpha/2=0.025

Then Z(alpha/2)=1.96

The confidence interval for the true binomial population proportion is

p'-Z(alpha)sqrt(p'\*q'/n) <= p <= p'+Z(alpha)sqrt(p'\*q'/n)

Hence, confidence interval is : 0.75009 <= p <= 0.8599

With 95% confidence, it can be concluded that between 75.01% and 85.99% of all enthusiasts who would like Lara to have a swinging ponytail and With this Confidence Interval, it is not good enough to go with the idea of Lara having a swinging Ponytail.

If the Confidence interval with 95% Confidence Level was ranging above 90%, then it would be a Good Decision for Eidos to go with Lara having a pony tail.

1. According to a survey published in the *Financial Times,* 56% of executives at Britain’s top 500 companies are less willing than they had been five years ago to sacrifice their family lifestyle for their career. If the survey consisted of a random sample of 40 executives, give a 95% confidence interval for the proportion of executives less willing to sacrifice their family lifestyle.

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n = 40

x = the number of executives less willing to sacrifice their family lifestyle = 22.4

p'=x/n=0.56

p′ = 0.56 is the sample proportion; this is the point estimate of the population proportion.

q′ = 1 – p′ = 1 – 0.56 = 0.44

Since the requested confidence level is CL = 0.95, then α = 1 – CL = 1 – 0.95 = 0.05

alpha/2=0.025

Then Z(alpha/2)=1.96

The confidence interval for the true binomial population proportion is

p'-Z(alpha)sqrt(p'\*q'/n) <= p <= p'+Z(alpha)sqrt(p'\*q'/n)

Hence, confidence interval is : 0.40617 <= p <= 0.71383

With 95% confidence, it can be concluded that between 40.62% and 71.38% of all executives less willing to sacrifice their family lifestyle

1. A survey of 5,250 business travelers worldwide conducted by OAG Business Travel Lifestyle indicated that 91% of business travelers consider legroom the most important in-flight feature. (Angle of seat recline and food service were second and third, respectively.) Give a 95% confidence interval for the proportion of all business travelers who consider legroom the most important feature.

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n = 5250

x = the number of travelers consider legroom the most important in-flight feature = 4777.5

p'=x/n=0.91

p′ = 0.91 is the sample proportion; this is the point estimate of the population proportion.

q′ = 1 – p′ = 1 – 0.91 = 0.09

Since the requested confidence level is CL = 0.95, then α = 1 – CL = 1 – 0.95 = 0.05

alpha/2=0.025

Then Z(alpha/2)=1.96

The confidence interval for the true binomial population proportion is

p'-Z(alpha)sqrt(p'\*q'/n) <= p <= p'+Z(alpha)sqrt(p'\*q'/n)

Hence, confidence interval is : 0.902259 <= p <= 0.917741

With 95% confidence, it can be concluded that between 90.2% and 91.8% of all travelers consider legroom the most important in-flight feature

1. According to *Money,* 60% of men have significant balding by age 50.24 If this finding is based on a random sample of 1,000 men of age 50, give a 95% confidence interval for the proportion of men of 50 who show some balding.

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n = 1000

x = the number of men have significant balding by age 50 = 600

p'=x/n=0.6

p′ = 0.6 is the sample proportion; this is the point estimate of the population proportion.

q′ = 1 – p′ = 1 – 0.6 = 0.4

Since the requested confidence level is CL = 0.95, then α = 1 – CL = 1 – 0.95 = 0.05

alpha/2=0.025

Then Z(alpha/2)=1.96

The confidence interval for the true binomial population proportion is

p'-Z(alpha)sqrt(p'\*q'/n) <= p <= p'+Z(alpha)sqrt(p'\*q'/n)

Hence, confidence interval is : 0.5696 <= p <= 0.6304

With 95% confidence, it can be concluded that between 56.96% and 63.04% of all men have significant balding by age 50