

Math 221: Lab - Part I**Version A**

Week 5

Title: Computing Binomial and Poisson Probabilities

Objectives:

- To practice using Excel to compute the binomial (BINOMDIST) and Poisson (POISSON) probabilities.
- To understand when each type of distribution is appropriate.

Directions

- Follow the information in sections 4.2 (textbook pages 184-192 and manual pages 97-107) and 4.3 (textbook pages 199-200 and manual pages 107-119) to complete the calculations for this lab.
- Supply all of your answers to this lab on an Excel spreadsheet that includes your name, course number and section, and data set letter.

A customer service department of a phone company wishes to analyze its performance. It measures its success in a number of ways. An important part of its responsibilities relates to the speed with which troubles in residential service can be repaired. In addition, it wishes to ensure that a sufficient number of phone operators are available to handle incoming phone requests.

- (1) Past data indicates that the likelihood is .62 that any reported problem with residential service can be repaired on the same day.
 - (a) For a specific 16 problems reported on a given day, construct a table indicating the probability that a certain number of problems will be repaired on the same day. In other words, find the probability that none are repaired, one is repaired, two are repaired, etc.
 - (b) Using any method, compute the probability that
 - (i) at least 8 problems will be repaired on the same day.
 - (ii) fewer than 12 problems will be repaired on the same day.
 - (iii) more than 6 but fewer than 14 problems will be repaired on the same day?
- (2) In a given hour, the customer service department averages 45 calls for repairs. If the number of calls satisfies a Poisson distribution, the company would like to know how many operators the department must employ to take incoming calls. Assume that each operator can handle 10 calls in a given hour.
 - (a) Compute the likelihood that the department will receive 40 calls. Also, compute the likelihood that the department will receive 41 calls in an hour. Also, compute the likelihood that the department will receive 42 calls, 43 calls, 44 calls, ... , 58 calls, 59 calls and 60 calls in an hour?
 - (b) What is the likelihood that the department will receive over 65 calls in an hour?
 - (c) What is the likelihood that the department will receive between 40 and 60 calls in an hour?¹
 - (d) If the company wishes to ensure that its department will be able to handle **all** incoming calls at least 80% of the time, what is the minimum number of workers that the department must hire?

¹This includes 40 and 60.

Math 221: Lab - Part I**Version B**

Week 5

Title: Computing Binomial and Poisson Probabilities

Objectives:

- To practice using Excel to compute the binomial (BINOMDIST) and Poisson (POISSON) probabilities.
- To understand when each type of distribution is appropriate.

Directions

- Follow the information in sections 4.2 (textbook pages 184-192 and manual pages 97-107) and 4.3 (textbook pages 199-200 and manual pages 107-119) to complete the calculations for this lab.
- Supply all of your answers to this lab on an Excel spreadsheet that includes your name, course number and section, and data set letter.

A customer service department of a phone company wishes to analyze its performance. It measures its success in a number of ways. An important part of its responsibilities relates to the speed with which troubles in residential service can be repaired. In addition, it wishes to ensure that a sufficient number of phone operators are available to handle incoming phone requests.

- (1) Past data indicates that the likelihood is .64 that any reported problem with residential service can be repaired on the same day.
 - (a) For a specific 16 problems reported on a given day, construct a table indicating the probability that a certain number of problems will be repaired on the same day. In other words, find the probability that none are repaired, one is repaired, two are repaired, etc.
 - (b) Using any method, compute the probability that
 - (i) at least 8 problems will be repaired on the same day.
 - (ii) fewer than 12 problems will be repaired on the same day.
 - (iii) more than 6 but fewer than 14 problems will be repaired on the same day?
- (2) In a given hour, the customer service department averages 46 calls for repairs. If the number of calls satisfies a Poisson distribution, the company would like to know how many operators the department must employ to take incoming calls. Assume that each operator can handle 10 calls in a given hour.
 - (a) Compute the likelihood that the department will receive 40 calls. Also, compute the likelihood that the department will receive 41 calls in an hour. Also, compute the likelihood that the department will receive 42 calls, 43 calls, 44 calls, ... , 58 calls, 59 calls and 60 calls in an hour?
 - (b) What is the likelihood that the department will receive over 65 calls in an hour?
 - (c) What is the likelihood that the department will receive between 40 and 60 calls in an hour?²
 - (d) If the company wishes to ensure that its department will be able to handle **all** incoming calls at least 80% of the time, what is the minimum number of workers that the department must hire?

²This includes 40 and 60.

Math 221: Lab - Part I**Version C**

Week 5

Title: Computing Binomial and Poisson Probabilities

Objectives:

- To practice using Excel to compute the binomial (BINOMDIST) and Poisson (POISSON) probabilities.
- To understand when each type of distribution is appropriate.

Directions

- Follow the information in sections 4.2 (textbook pages 184-192 and manual pages 97-107) and 4.3 (textbook pages 199-200 and manual pages 107-119) to complete the calculations for this lab.
- Supply all of your answers to this lab on an Excel spreadsheet that includes your name, course number and section, and data set letter.

A customer service department of a phone company wishes to analyze its performance. It measures its success in a number of ways. An important part of its responsibilities relates to the speed with which troubles in residential service can be repaired. In addition, it wishes to ensure that a sufficient number of phone operators are available to handle incoming phone requests.

- (1) Past data indicates that the likelihood is .66 that any reported problem with residential service can be repaired on the same day.
 - (a) For a specific 16 problems reported on a given day, construct a table indicating the probability that a certain number of problems will be repaired on the same day. In other words, find the probability that none are repaired, one is repaired, two are repaired, etc.
 - (b) Using any method, compute the probability that
 - (i) at least 8 problems will be repaired on the same day.
 - (ii) fewer than 12 problems will be repaired on the same day.
 - (iii) more than 6 but fewer than 14 problems will be repaired on the same day?
- (2) In a given hour, the customer service department averages 47 calls for repairs. If the number of calls satisfies a Poisson distribution, the company would like to know how many operators the department must employ to take incoming calls. Assume that each operator can handle 10 calls in a given hour.
 - (a) Compute the likelihood that the department will receive 40 calls. Also, compute the likelihood that the department will receive 41 calls in an hour. Also, compute the likelihood that the department will receive 42 calls, 43 calls, 44 calls, ... , 58 calls, 59 calls and 60 calls in an hour?
 - (b) What is the likelihood that the department will receive over 65 calls in an hour?
 - (c) What is the likelihood that the department will receive between 40 and 60 calls in an hour?³
 - (d) If the company wishes to ensure that its department will be able to handle **all** incoming calls at least 80% of the time, what is the minimum number of workers that the department must hire?

³This includes 40 and 60.

Math 221: Lab - Part I**Version D**

Week 5

Title: Computing Binomial and Poisson Probabilities

Objectives:

- To practice using Excel to compute the binomial (BINOMDIST) and Poisson (POISSON) probabilities.
- To understand when each type of distribution is appropriate.

Directions

- Follow the information in sections 4.2 (textbook pages 184-192 and manual pages 97-107) and 4.3 (textbook pages 199-200 and manual pages 107-119) to complete the calculations for this lab.
- Supply all of your answers to this lab on an Excel spreadsheet that includes your name, course number and section, and data set letter.

A customer service department of a phone company wishes to analyze its performance. It measures its success in a number of ways. An important part of its responsibilities relates to the speed with which troubles in residential service can be repaired. In addition, it wishes to ensure that a sufficient number of phone operators are available to handle incoming phone requests.

- (1) Past data indicates that the likelihood is .68 that any reported problem with residential service can be repaired on the same day.
 - (a) For a specific 16 problems reported on a given day, construct a table indicating the probability that a certain number of problems will be repaired on the same day. In other words, find the probability that none are repaired, one is repaired, two are repaired, etc.
 - (b) Using any method, compute the probability that
 - (i) at least 8 problems will be repaired on the same day.
 - (ii) fewer than 12 problems will be repaired on the same day.
 - (iii) more than 6 but fewer than 14 problems will be repaired on the same day?
- (2) In a given hour, the customer service department averages 48 calls for repairs. If the number of calls satisfies a Poisson distribution, the company would like to know how many operators the department must employ to take incoming calls. Assume that each operator can handle 10 calls in a given hour.
 - (a) Compute the likelihood that the department will receive 40 calls. Also, compute the likelihood that the department will receive 41 calls in an hour. Also, compute the likelihood that the department will receive 42 calls, 43 calls, 44 calls, ... , 58 calls, 59 calls and 60 calls in an hour?
 - (b) What is the likelihood that the department will receive over 65 calls in an hour?
 - (c) What is the likelihood that the department will receive between 40 and 60 calls in an hour?⁴
 - (d) If the company wishes to ensure that its department will be able to handle **all** incoming calls at least 80% of the time, what is the minimum number of workers that the department must hire?

⁴This includes 40 and 60.

Math 221: Lab - Part I**Version E**

Week 5

Title: Computing Binomial and Poisson Probabilities

Objectives:

- To practice using Excel to compute the binomial (BINOMDIST) and Poisson (POISSON) probabilities.
- To understand when each type of distribution is appropriate.

Directions

- Follow the information in sections 4.2 (textbook pages 184-192 and manual pages 97-107) and 4.3 (textbook pages 199-200 and manual pages 107-119) to complete the calculations for this lab.
- Supply all of your answers to this lab on an Excel spreadsheet that includes your name, course number and section, and data set letter.

A customer service department of a phone company wishes to analyze its performance. It measures its success in a number of ways. An important part of its responsibilities relates to the speed with which troubles in residential service can be repaired. In addition, it wishes to ensure that a sufficient number of phone operators are available to handle incoming phone requests.

- (1) Past data indicates that the likelihood is .70 that any reported problem with residential service can be repaired on the same day.
 - (a) For a specific 16 problems reported on a given day, construct a table indicating the probability that a certain number of problems will be repaired on the same day. In other words, find the probability that none are repaired, one is repaired, two are repaired, etc.
 - (b) Using any method, compute the probability that
 - (i) at least 8 problems will be repaired on the same day.
 - (ii) fewer than 12 problems will be repaired on the same day.
 - (iii) more than 6 but fewer than 14 problems will be repaired on the same day?
- (2) In a given hour, the customer service department averages 49 calls for repairs. If the number of calls satisfies a Poisson distribution, the company would like to know how many operators the department must employ to take incoming calls. Assume that each operator can handle 10 calls in a given hour.
 - (a) Compute the likelihood that the department will receive 40 calls. Also, compute the likelihood that the department will receive 41 calls in an hour. Also, compute the likelihood that the department will receive 42 calls, 43 calls, 44 calls, ... , 58 calls, 59 calls and 60 calls in an hour?
 - (b) What is the likelihood that the department will receive over 65 calls in an hour?
 - (c) What is the likelihood that the department will receive between 40 and 60 calls in an hour?⁵
 - (d) If the company wishes to ensure that its department will be able to handle **all** incoming calls at least 80% of the time, what is the minimum number of workers that the department must hire?

⁵This includes 40 and 60.

Math 221: Lab - Part I**Version F**

Week 5

Title: Computing Binomial and Poisson Probabilities

Objectives:

- To practice using Excel to compute the binomial (BINOMDIST) and Poisson (POISSON) probabilities.
- To understand when each type of distribution is appropriate.

Directions

- Follow the information in sections 4.2 (textbook pages 184-192 and manual pages 97-107) and 4.3 (textbook pages 199-200 and manual pages 107-119) to complete the calculations for this lab.
- Supply all of your answers to this lab on an Excel spreadsheet that includes your name, course number and section, and data set letter.

A customer service department of a phone company wishes to analyze its performance. It measures its success in a number of ways. An important part of its responsibilities relates to the speed with which troubles in residential service can be repaired. In addition, it wishes to ensure that a sufficient number of phone operators are available to handle incoming phone requests.

- (1) Past data indicates that the likelihood is .72 that any reported problem with residential service can be repaired on the same day.
 - (a) For a specific 16 problems reported on a given day, construct a table indicating the probability that a certain number of problems will be repaired on the same day. In other words, find the probability that none are repaired, one is repaired, two are repaired, etc.
 - (b) Using any method, compute the probability that
 - (i) at least 8 problems will be repaired on the same day.
 - (ii) fewer than 12 problems will be repaired on the same day.
 - (iii) more than 6 but fewer than 14 problems will be repaired on the same day?
- (2) In a given hour, the customer service department averages 50 calls for repairs. If the number of calls satisfies a Poisson distribution, the company would like to know how many operators the department must employ to take incoming calls. Assume that each operator can handle 10 calls in a given hour.
 - (a) Compute the likelihood that the department will receive 40 calls. Also, compute the likelihood that the department will receive 41 calls in an hour. Also, compute the likelihood that the department will receive 42 calls, 43 calls, 44 calls, ... , 58 calls, 59 calls and 60 calls in an hour?
 - (b) What is the likelihood that the department will receive over 65 calls in an hour?
 - (c) What is the likelihood that the department will receive between 40 and 60 calls in an hour?⁶
 - (d) If the company wishes to ensure that its department will be able to handle **all** incoming calls at least 80% of the time, what is the minimum number of workers that the department must hire?

⁶This includes 40 and 60.

Math 221: Lab - Part I

Version G

Week 5

Title: Computing Binomial and Poisson Probabilities

Objectives:

- To practice using Excel to compute the binomial (BINOMDIST) and Poisson (POISSON) probabilities.
- To understand when each type of distribution is appropriate.

Directions

- Follow the information in sections 4.2 (textbook pages 184-192 and manual pages 97-107) and 4.3 (textbook pages 199-200 and manual pages 107-119) to complete the calculations for this lab.
- Supply all of your answers to this lab on an Excel spreadsheet that includes your name, course number and section, and data set letter.

A customer service department of a phone company wishes to analyze its performance. It measures its success in a number of ways. An important part of its responsibilities relates to the speed with which troubles in residential service can be repaired. In addition, it wishes to ensure that a sufficient number of phone operators are available to handle incoming phone requests.

- (1) Past data indicates that the likelihood is .74 that any reported problem with residential service can be repaired on the same day.
 - (a) For a specific 16 problems reported on a given day, construct a table indicating the probability that a certain number of problems will be repaired on the same day. In other words, find the probability that none are repaired, one is repaired, two are repaired, etc.
 - (b) Using any method, compute the probability that
 - (i) at least 8 problems will be repaired on the same day.
 - (ii) fewer than 12 problems will be repaired on the same day.
 - (iii) more than 6 but fewer than 14 problems will be repaired on the same day?
- (2) In a given hour, the customer service department averages 51 calls for repairs. If the number of calls satisfies a Poisson distribution, the company would like to know how many operators the department must employ to take incoming calls. Assume that each operator can handle 10 calls in a given hour.
 - (a) Compute the likelihood that the department will receive 40 calls. Also, compute the likelihood that the department will receive 41 calls in an hour. Also, compute the likelihood that the department will receive 42 calls, 43 calls, 44 calls, ... , 58 calls, 59 calls and 60 calls in an hour?
 - (b) What is the likelihood that the department will receive over 65 calls in an hour?
 - (c) What is the likelihood that the department will receive between 40 and 60 calls in an hour?⁷
 - (d) If the company wishes to ensure that its department will be able to handle **all** incoming calls at least 80% of the time, what is the minimum number of workers that the department must hire?

⁷This includes 40 and 60.

Math 221: Lab - Part I

Version H

Week 5

Title: Computing Binomial and Poisson Probabilities

Objectives:

- To practice using Excel to compute the binomial (BINOMDIST) and Poisson (POISSON) probabilities.
- To understand when each type of distribution is appropriate.

Directions

- Follow the information in sections 4.2 (textbook pages 184-192 and manual pages 97-107) and 4.3 (textbook pages 199-200 and manual pages 107-119) to complete the calculations for this lab.
- Supply all of your answers to this lab on an Excel spreadsheet that includes your name, course number and section, and data set letter.

A customer service department of a phone company wishes to analyze its performance. It measures its success in a number of ways. An important part of its responsibilities relates to the speed with which troubles in residential service can be repaired. In addition, it wishes to ensure that a sufficient number of phone operators are available to handle incoming phone requests.

- (1) Past data indicates that the likelihood is .76 that any reported problem with residential service can be repaired on the same day.
 - (a) For a specific 16 problems reported on a given day, construct a table indicating the probability that a certain number of problems will be repaired on the same day. In other words, find the probability that none are repaired, one is repaired, two are repaired, etc.
 - (b) Using any method, compute the probability that
 - (i) at least 8 problems will be repaired on the same day.
 - (ii) fewer than 12 problems will be repaired on the same day.
 - (iii) more than 6 but fewer than 14 problems will be repaired on the same day?
- (2) In a given hour, the customer service department averages 52 calls for repairs. If the number of calls satisfies a Poisson distribution, the company would like to know how many operators the department must employ to take incoming calls. Assume that each operator can handle 10 calls in a given hour.
 - (a) Compute the likelihood that the department will receive 40 calls. Also, compute the likelihood that the department will receive 41 calls in an hour. Also, compute the likelihood that the department will receive 42 calls, 43 calls, 44 calls, ... , 58 calls, 59 calls and 60 calls in an hour?
 - (b) What is the likelihood that the department will receive over 65 calls in an hour?
 - (c) What is the likelihood that the department will receive between 40 and 60 calls in an hour?⁸
 - (d) If the company wishes to ensure that its department will be able to handle **all** incoming calls at least 80% of the time, what is the minimum number of workers that the department must hire?

⁸This includes 40 and 60.

Math 221: Lab - Part I**Version I**

Week 5

Title: Computing Binomial and Poisson Probabilities

Objectives:

- To practice using Excel to compute the binomial (BINOMDIST) and Poisson (POISSON) probabilities.
- To understand when each type of distribution is appropriate.

Directions

- Follow the information in sections 4.2 (textbook pages 184-192 and manual pages 97-107) and 4.3 (textbook pages 199-200 and manual pages 107-119) to complete the calculations for this lab.
- Supply all of your answers to this lab on an Excel spreadsheet that includes your name, course number and section, and data set letter.

A customer service department of a phone company wishes to analyze its performance. It measures its success in a number of ways. An important part of its responsibilities relates to the speed with which troubles in residential service can be repaired. In addition, it wishes to ensure that a sufficient number of phone operators are available to handle incoming phone requests.

- (1) Past data indicates that the likelihood is .78 that any reported problem with residential service can be repaired on the same day.
 - (a) For a specific 16 problems reported on a given day, construct a table indicating the probability that a certain number of problems will be repaired on the same day. In other words, find the probability that none are repaired, one is repaired, two are repaired, etc.
 - (b) Using any method, compute the probability that
 - (i) at least 8 problems will be repaired on the same day.
 - (ii) fewer than 12 problems will be repaired on the same day.
 - (iii) more than 6 but fewer than 14 problems will be repaired on the same day?
- (2) In a given hour, the customer service department averages 53 calls for repairs. If the number of calls satisfies a Poisson distribution, the company would like to know how many operators the department must employ to take incoming calls. Assume that each operator can handle 10 calls in a given hour.
 - (a) Compute the likelihood that the department will receive 40 calls. Also, compute the likelihood that the department will receive 41 calls in an hour. Also, compute the likelihood that the department will receive 42 calls, 43 calls, 44 calls, ... , 58 calls, 59 calls and 60 calls in an hour?
 - (b) What is the likelihood that the department will receive over 65 calls in an hour?
 - (c) What is the likelihood that the department will receive between 40 and 60 calls in an hour?⁹
 - (d) If the company wishes to ensure that its department will be able to handle **all** incoming calls at least 80% of the time, what is the minimum number of workers that the department must hire?

⁹This includes 40 and 60.

Math 221: Lab - Part I**Version J**

Week 5

Title: Computing Binomial and Poisson Probabilities

Objectives:

- To practice using Excel to compute the binomial (BINOMDIST) and Poisson (POISSON) probabilities.
- To understand when each type of distribution is appropriate.

Directions

- Follow the information in sections 4.2 (textbook pages 184-192 and manual pages 97-107) and 4.3 (textbook pages 199-200 and manual pages 107-119) to complete the calculations for this lab.
- Supply all of your answers to this lab on an Excel spreadsheet that includes your name, course number and section, and data set letter.

A customer service department of a phone company wishes to analyze its performance. It measures its success in a number of ways. An important part of its responsibilities relates to the speed with which troubles in residential service can be repaired. In addition, it wishes to ensure that a sufficient number of phone operators are available to handle incoming phone requests.

- (1) Past data indicates that the likelihood is .80 that any reported problem with residential service can be repaired on the same day.
 - (a) For a specific 16 problems reported on a given day, construct a table indicating the probability that a certain number of problems will be repaired on the same day. In other words, find the probability that none are repaired, one is repaired, two are repaired, etc.
 - (b) Using any method, compute the probability that
 - (i) at least 8 problems will be repaired on the same day.
 - (ii) fewer than 12 problems will be repaired on the same day.
 - (iii) more than 6 but fewer than 14 problems will be repaired on the same day?
- (2) In a given hour, the customer service department averages 54 calls for repairs. If the number of calls satisfies a Poisson distribution, the company would like to know how many operators the department must employ to take incoming calls. Assume that each operator can handle 10 calls in a given hour.
 - (a) Compute the likelihood that the department will receive 40 calls. Also, compute the likelihood that the department will receive 41 calls in an hour. Also, compute the likelihood that the department will receive 42 calls, 43 calls, 44 calls, ... , 58 calls, 59 calls and 60 calls in an hour?
 - (b) What is the likelihood that the department will receive over 65 calls in an hour?
 - (c) What is the likelihood that the department will receive between 40 and 60 calls in an hour?¹⁰
 - (d) If the company wishes to ensure that its department will be able to handle **all** incoming calls at least 80% of the time, what is the minimum number of workers that the department must hire?

¹⁰This includes 40 and 60.