# MATH 1030: Statistics Project Part 2

**Worth: 80 points**

**Deadline:** Due by the end of Module 12

**Directions:**Please download and save this Microsoft Word document. You must submit this document (copy your Excel work into this Word document) to the Project Part 2 Submission folder by the end of Module 12.Hint: It is a smart idea to save all your Excel work in one Excel file, clearly labeling and showing your work for each problem as a backup.

# Project Detail: You are a crime scene technician and specialize in shoe print impressions left at crime scenes. Though you often study the prints for the tread and type of shoe worn, you also would like to see if you can gather any other information about the suspect from the shoe print. You have taken a random sample of 15 crime scenes from solved cases in your county. The data set includes variables regarding gender, age, foot length (in cm), shoe print length (in cm), shoe size, and height (in cm).

# Part 2

# Use the data from Table 1 below to complete Part 2 of your project.

# Table 1: Shoe Print Data from 15 Crime Scenes

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **A** | **B** | **C** | **D** | **E** | **F** |
| **Gender** | **Age** | **Foot length (in cm)** | **Shoe print length (in cm)** | **Shoe size** | **Height (in cm)** |
| F | 19 | 23.7 | 27.6 | 7 | 175.9 |
| M | 20 | 27.8 | 31.4 | 11.5 | 183.3 |
| M | 23 | 26.7 | 31.3 | 11 | 184.8 |
| M | 26 | 26.8 | 31.8 | 11 | 180.3 |
| F | 26 | 24.6 | 25.4 | 8 | 162.6 |
| F | 27 | 23.8 | 27.9 | 8.5 | 165.1 |
| M | 29 | 28.1 | 31 | 10.5 | 175.3 |
| M | 30 | 27.5 | 31.4 | 11 | 190.5 |
| M | 31 | 26.7 | 32.4 | 10.5 | 180.3 |
| F | 36 | 24.6 | 28.1 | 9 | 179.1 |
| M | 38 | 28.8 | 31.6 | 12 | 195 |
| F | 41 | 23.8 | 27.9 | 8 | 165.1 |
| M | 48 | 27.9 | 31.4 | 11 | 185.4 |
| M | 49 | 26.7 | 31.8 | 10 | 175.3 |
| M | 58 | 23.7 | 27.9 | 8.5 | 162.4 |

1. We want to determine which factors are associated with height.
2. Create a scatterplot of shoe print length and height. Paste your graph below. Make sure your graph has a proper title and axes labels. (See video link below if needed.)
3. Find the correlation coefficient of shoe print length and height. Paste your correlation coefficient below. Interpret the direction and strength of the correlation coefficient. (See video link below if needed.)
4. Create a scatterplot of age and height. Paste your graph below. Make sure your graph has a proper title and axes labels. (See video link below if needed.)
5. Find the correlation coefficient of age and height. Paste your correlation coefficient below. Interpret the direction and strength of the correlation coefficient. (See video link below if needed.)
6. Using your answers from part B and part D, is shoe print length or age more strongly correlated with height?
7. Is this result what you would expect? Why or why not?
8. Complete a regression analysis using shoe print length (x variable) to predict height (y variable). Show all of your work. (See video link below if needed.)
9. Paste your regression analysis output below.
10. Using the output in part A, write out the linear equation to predict height based on our data set.
11. Use your regression equation in part B to estimate the height of a suspect who has a shoe print length of 30 cm. Show all of your work.
12. Using Table 1, find the probability that a suspect is male.
13. Using Table 1, find the probability that a female suspect wears a size 8 shoe.
14. Use the height variable (Column F) **for males only** and the following frequency distribution to answer parts A and B below.

|  |
| --- |
| **Frequency Distribution** |
| 162–171.9 |
| 172–181.9 |
| 182–191.9 |
| 192–201.9 |

1. Create a bar chart or histogram of the height data of the male suspects. Make sure to include a title on your graph and label each axis. Paste your graph below. (See video link below if needed.)
2. Based on the shape of the bar chart or histogram in part A, does male height appear to follow a normal distribution? Why or why not?
3. The mean and standard deviation of the suspect shoe size in your sample is given below.

Mean suspect shoe size: 10

Standard deviation: 1.5

1. Use the mean and standard deviation above to calculate the z-score of a size 13 shoe.
2. Explain what this z-score tells us.

# VIDEOS

* [*Creating a Column Chart or Bar Chart in Excel*](https://www.youtube.com/watch?v=iAgjftWk-sw)
* [Statistics in Excel—Mean (Average), Median, Mode, and Standard Deviation](https://www.youtube.com/watch?v=TK6tIkpkt8Q)
* [The Normal Distribution and the 68-95-99.7 Rule (5.2)](https://www.youtube.com/watch?v=mtbJbDwqWLE&t=12s)
* [Why Do We Need Z Scores? (Ask Antonio) (9-3](https://www.youtube.com/watch?v=fnU42Ue9utk)
* [Scatter Diagrams, Correlation, and Regression in Excel 2016](https://nam04.safelinks.protection.outlook.com/?url=https%3A%2F%2Fyoutu.be%2F7CBCHO8NK48&data=02%7C01%7Cjebaham%40bryantstratton.edu%7C55cf7a8cdec1401c2f6708d78ea96eda%7C256350c3abab48ffa818ca2c65163d91%7C0%7C0%7C637134730686710680&sdata=0AUPyhzKpVdnGVaS7SMjjUIvnwiipRfSOsGqPXeihBg%3D&reserved=0)