In order to complete this project you will need to become part of a group of three or four students. I reserve the right to engineer the membership of a group but will do so reluctantly. You must inform me by Monday, November 8th, as to the members in your group and their respective jobs.

Realize, up front, some of my expectations about this project.
The completion of this project requires a typed paper written in proper English form; grammar, punctuation and spelling are important.
Research is an important part of this project. Your report must include a bibliography. It is not expected that you will develop all of the work for this problem entirely on your own. Any source you use must be identified in the bibliography. At the very least, your textbook must be listed.
Although I want the group to develop the solutions on their own, assistance from other people is acceptable provided each source is identified in the bibliography. I am available during usual office hours to answer questions or review proposed solutions with the Contact Person. I will also give direction for further work.

Your grade on this project will be determined based upon the following five components. Each component is worth up to ten (10) points.
1) The completeness of the project. (All parts of the given problem are addressed and all questions answered.)
2) The mathematical content of your paper. (The mathematics components are shown in good form and the solutions given are correct and verifiable.)
3) English Presentation. (I am not an English teacher but, incorrect spellings and sentence structures as well as paragraphs that require me to read them several times to understand will be noted.)
4) Group progress reports as described below.
5) A confidential grade provided by the other members of your group based upon a question on the final exam.

Within your group you must identify the following individuals.
1) Group Leader: This person will be the final decision maker for your group. S/He will coordinate meeting times, ensure that each person in the group has done their part and is contributing to the project, and maintain the group’s focus. If you only have a group of three, you need to divide up the responsibilities for this position accordingly.
2) Contact Person: This individual will be the only one from your group who may discuss the project with me. Any information which I feel is necessary to clarify details of the project will be given to the contact person who will be responsible, in turn, for relating it to other members of the group.
3) Chief Editor: This individual will be responsible for editing the final report. Other individuals must write and contribute material but this person will be the one responsible for editing the final document. This person should have access to whatever resources the group decides are needed for the report format, such as a typewriter, a computer word processor or drawing materials. This person does NOT write the report!
4) Chief Mathematician: This person will be responsible for verifying all mathematical manipulations and presenting them in a consistent format. All members of the group must participate in the solutions of the problem. This individual will be responsible for checking the mathematics in the final report and assuring that all members of the group understand the solutions developed. This person does NOT do all of the math!

You must develop a timeline for working on the project. The writing of the report need not wait for completion of the mathematical solutions. In fact, I encourage the development of an outline for the report early in the process. Towards this end, I will impose the following deadlines:
Monday, November 15th Contact Person identifies individual assignments for each member of the group.
Monday, November 22nd Contact Person reports on the status of the problem solutions and outline of the report.
Monday, November 29th All parts of the problem solved. (At this time, if the group does not have a complete solution, the Contact Person may request some special assistance.)
MATH 85 Project
Body Mass Index (BMI)

The accompanying article from The Morning News Tribune gives a method by which a person can calculate his/her Body Mass Index (BMI). It also makes several statements about the U. S. population and the percentage of people with certain BMIs. Your group is to collect some data and compare it to the percentages presented in the article.

Each person in your group is to collect information from at least five people. (You can count yourself as one set of data; the minimum age for your subjects is 17.) For each person collect their age, gender, height (in inches) and weight (in pounds). Calculate each individual’s BMI using the formula given in the article. Then assemble all the data for your group in a table similar to the following. Each line represents one person for whom you collected information and calculated a BMI.

<table>
<thead>
<tr>
<th>Age</th>
<th>Gender</th>
<th>Height (in inches)</th>
<th>Weight (in pounds)</th>
<th>BMI</th>
<th>Waist Circumference (optional)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

You should have at least 20 entries (lines of data) in your table. Round height, weight, and BMI to the nearest tenth.

Using the data in your table construct three separate scatter plots – use graph paper. In each case, the BMI will be the vertical axis. One graph will have Age as the horizontal axis, the second will have the Height as the horizontal and the third graph will use Weight as the horizontal axis. These graphs are to be done by hand, one graph per sheet of graph paper. You are NOT to use a spreadsheet to do any calculations or make any graphs! Be sure to use proper graphing etiquette (this should include such things as units on your axes as well as titles for each graph).

Write about your data and your graphs. Conclude with a comparison of how your data fits with the information presented in the article. Be sure to calculate the percentages of your sample data that fit in each category of the table in the article. What is your conclusion about the weight of people in the U. S. population? This paper should be about a page and a half to two pages long.

Calculating BMI

\[(\text{Weight})(.45) = W\]
\[\left(\left(\text{Height in inches})(.0254)\right)^2\right) = H\]
\[W \div H = BMI\]

The government considers a Body Mass Index over 25 to be too high. Here’s how to figure yours: First, multiply your weight in pounds by .45 to get kilograms. Check that your height is in inches. Multiply this number by .0254 to get meters. Multiply that number by itself. Then divide this into your weight in kilograms. Your answer will probably be a number in the 20s or low 30s. It is your BMI. These calculations cannot be done using a spreadsheet. I need to see the work on these in your final report.

Please do not bother to enclose your project in any fancy folders. While I appreciate the thought, it is not something I want you to do.

Acknowledgement: Thanks to Ed Zimmerman at TCC for sharing his project.
Research on obesity has shown that one way to measure a person’s weight status is to use a calculation known as **body mass index**, or **BMI** for short. If someone has a high BMI, does that mean that they are definitely overweight or obese? Furthermore, does that mean that they are at increased risk for health problems? The answers to both of these questions depend on other factors.

Keep in mind that BMI is a screening tool; it is not used to diagnose any medical conditions but instead, is used as one measure to assess a person's weight and their risk for developing certain medical conditions.

**What Is the Risk?**

Over 130 million adult Americans are overweight or obese. People who are overweight or obese have a greater chance of developing many medical conditions, including:

- **High blood pressure (hypertension)**
- **High cholesterol** or other lipid disorders
- **Type 2 diabetes**
- **Heart disease**
- **Stroke**
- Certain cancers
- **Sleep apnea**
- **Osteoarthritis**
- Gallbladder disease
- Fatty liver disease

Even a small weight loss (just 10 percent of your current weight) will help to lower your risk of developing those diseases.

**BMI** is just one factor to consider when assessing a person’s **ideal weight**. To determine if excess weight is a health risk, a healthcare provider will perform further assessments. According to the recent guidelines, assessment of weight involves using three key measures:

- BMI
- Waist circumference
- Risk factors for diseases and conditions associated with obesity

**BMI**

**Waist Circumference**

To determine your waist circumference, place a measuring tape snugly around your waist. It is a good indicator of your abdominal fat, which is another predictor of your chance for developing **risk factors for heart disease** and other serious health conditions. This risk increases with a waist measurement of over 40 inches in men and over 35 inches in women.

The table below provides you with an idea of whether your BMI combined with your waist circumference increases your risk for developing obesity-related diseases or conditions.
### Classification of Overweight and Obesity by BMI, Waist Circumference, and Associated Disease Risks

<table>
<thead>
<tr>
<th>BMI (kg/m²)</th>
<th>Obesity Class</th>
<th>Men 102 cm (40 in) or less</th>
<th>Men &gt; 102 cm (40 in)</th>
<th>Women 88 cm (35 in) or less</th>
<th>Women &gt; 88 cm (35 in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underweight</td>
<td>&lt; 18.5</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Normal</td>
<td>18.5 - 24.9</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Overweight</td>
<td>25.0 - 29.9</td>
<td>Increased</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Obesity</td>
<td>30.0 - 34.9</td>
<td>I</td>
<td>High</td>
<td>Very High</td>
<td>Very High</td>
</tr>
<tr>
<td></td>
<td>35.0 - 39.9</td>
<td>II</td>
<td>Very High</td>
<td>Very High</td>
<td>Very High</td>
</tr>
<tr>
<td>Extreme Obesity</td>
<td>40.0 +</td>
<td>III</td>
<td>Extremely High</td>
<td>Extremely High</td>
<td>Extremely High</td>
</tr>
</tbody>
</table>

* Disease risk for type 2 diabetes, hypertension, and cardiovascular disease.

### Other Risk Factors

Finally, prior to making an assessment of the risk for certain health conditions associated with a person’s weight, the healthcare provider will consider additional risk factors besides weight. These risk factors include:

- **High blood pressure** (hypertension)
- **High cholesterol**
- High LDL cholesterol ("bad" cholesterol)
- Low HDL cholesterol ("good" cholesterol)
- **High triglycerides**
- High blood glucose (sugar)
- Family history of premature heart disease
- Physical inactivity
- Cigarette smoking

### Assessing the Risk of BMI and Weight

Once the doctor has determined BMI, waist circumference, and other risk factors, he or she can offer recommendations.

For people who are considered obese (BMI greater than or equal to 30) or those who are overweight (BMI of 25 to 29.9) and have two or more risk factors, the guidelines recommend weight loss. Even a small weight loss (just 10 percent of your current weight) will help to lower your risk of developing diseases associated with obesity.

Patients who are overweight, do not have a high waist measurement, and have less than two risk factors may need to prevent further weight gain rather than lose weight.

If you still have questions after reading this eMedTV article, ask your healthcare provider about BMI and weight. Together, you can decide on a plan that works for you.