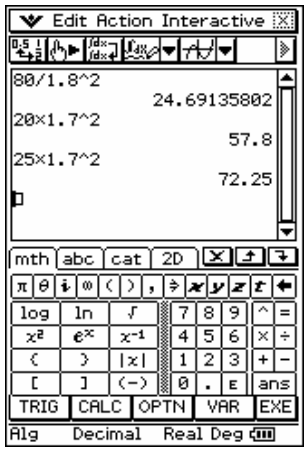
Obesity – a global epidemic

Checkpoints

Activity 1: Working with the BMI.

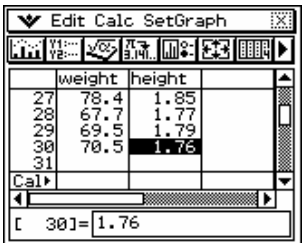


Answers.

1. My BMI can be calculated to be 24.7, meaning that I am *not* overweight – just.

2. Someone 1.7 metres tall with a BMI of 20 to 25 would weigh in between 57.8 kg and 72.25 kg.

Activity 2: Evaluating the BMI model for percentage body fat.



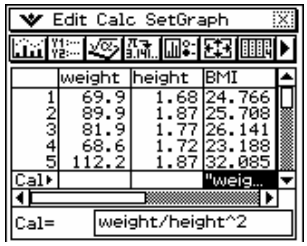
Part A – Data Entry

Firstly naming `list1` and `list2` and then entering the weight and height data gives,

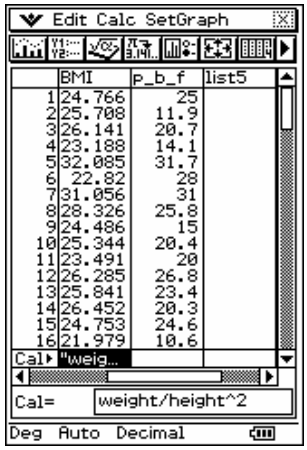
Part B – Calculating the BMI

Tap in the heading row of `list3` and name it as BMI.

Tap in the `Cal` row of `list3` and enter the BMI formula as `weight/height^2`.



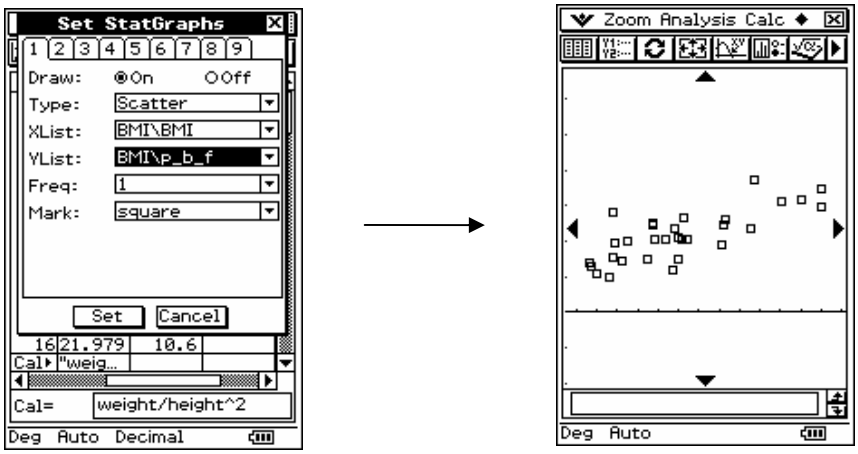
Answers.



1. Comparing the values of `BMI` and `p_b_f` (% body fat) we can see that BMI is similar to percentage body fat for some individuals but not for others.

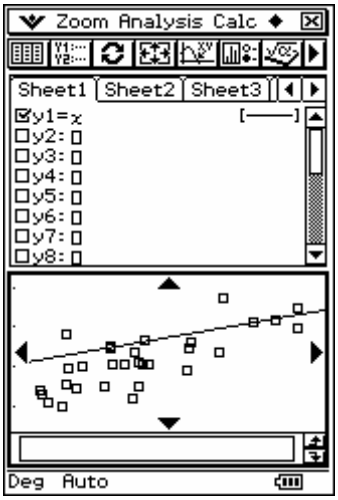
2. If there was a perfect correspondence between BMI and percentage body fat then all the points in the scatter plot would fall on the line $y=x$ as this represents *percentage body fat = BMI*.

3. For our data some points would fall on this line but many would not. It is hard to tell exactly how the points would vary for this line.

4. 

5. Due to the generally linear shape of the scatter plot there seems to be some degree of linear correlation between percentage body fat and BMI. Whether or not this linear correlation represents *equality*, i.e. the linear relationship *percentage body fat = BMI*, is unclear from the graph above.

   One very useful way to investigate this question further is to draw the line $y=x$ on the scatter plot. This can be done by tapping [Y1= Y2=] and entering the function $y=x$ and then tapping [graph].

   The fact that the line $y=x$ does not represent the shape apparent in the scatter plot suggests that the relationship of equality does not exist between BMI and percentage body fat.

6. The number of points *beneath* the line $y=x$ in the lower BMI region (left hand side of the graph) shows that, for individuals with a low BMI, BMI frequently *over predicts* percentage body fat. The closer proximity of points to the line $y=x$ for larger BMI values suggests that, for individuals with larger BMI's, their BMI's are a better estimate of percentage body fat.

Activity 3: Doing better than *percentage body fat = BMI*

Answers

1. Choosing a linear algebraic model, because of the generally linear shape of our scatter plot, the co-efficients of this model can be found by tapping `Calc`, `Linear Reg` , and setting up this calculation gives us,

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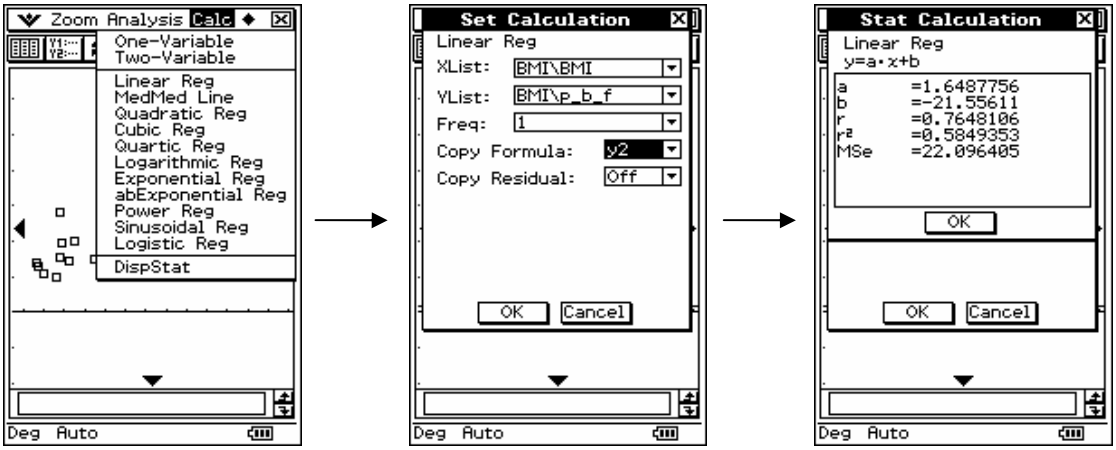
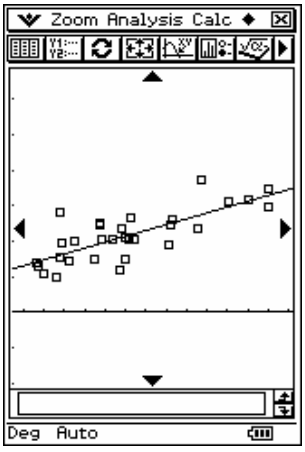
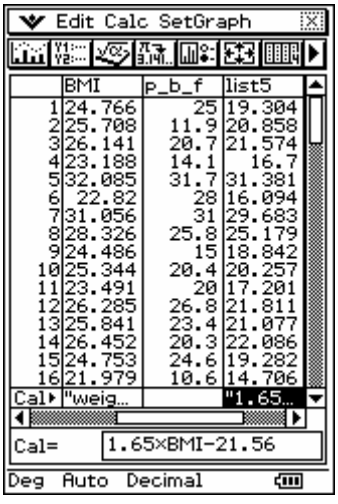


This linear relationship,

percentage body fat = 1.65×BMI – 21.56,

fits the data that we have used much better than the idea that *percentage body fat = BMI*. This can be confirmed by generating a series of values and and comparing these to percentage body fat.





The values given by the rule *1.65×BMI – 21.56* seems to correlate to percentage body better that BMI. However, there is still a significant degree of variation in percentage body fat that cannot be attributed to the new rule. This variation could be caused by factors like fitness level and body type, factors that are not incorporated into the BMI calculation but obviously have a bearing on percentage body fat.

It should be noted that this variation is less for individuals with higher percentage body fat, making judgments using BMI-based rules more appropriate in cases of excess weight and obesity. At best, however, a BMI-based calculation can only provide a warning sign of weight problems. A more detailed analysis of an individual's percentage body fat, and of the potential health implications, should then be undertaken by a health care professional.