**Question 32 [from 2016 Sem I Paper] (13 marks)**

The standard treatment for hypothyroidism is daily use of synthetic thyroid hormone levothyroxine (T4). This medication restores adequate hormone levels for the individual to lead a normal life. One to two weeks after starting the treatment, symptoms should start to reduce. The medication gradually lowers cholesterol levels (LDL – low density lipoproteins) and may reverse weight gain.

Trials were carried out on 60 test subjects, all with similar severity of hypothyroidism, to see if there was any evidence that levothyroxine reduced LDL-cholesterol in the blood stream. 30 patients were given levothyroxine and the other 30 were given a placebo in a blind experiment. Patients were asked to take the drug daily for 8 weeks, and at the end of each week their blood LDL-cholesterol levels were measured.

Below are the average results for the two different groups:

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| Number of weeks | Average Blood cholesterol levels in mg/dL | |
| Patients taking levothyroxine | Patients taking the placebo |
| 0 | 190 | 191 |
| 1 | 190 | 191 |
| 2 | 189 | 190 |
| 3 | 180 | 187 |
| 4 | 173 | 189 |
| 5 | 171 | 179 |
| 6 | 168 | 188 |
| 7 | 153 | 189 |
| 8 | 147 | 187 |

1. Write a suitable hypothesis for this experiment. (1 mark)

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1. State two variables that would need to be controlled that are not mentioned. (2 marks)

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1. What is a placebo? (1 mark)

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1. Plot a graph of the data contained in the table. (5 marks)

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1. What conclusion can be drawn from the results? (2 marks)

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1. How could this experiment be made more reliable? (2 marks)

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