Complete the following questions with the other students in your group

- 1. A statistical study with 7500 subjects found statistically significant results at the 5% level. Explain why this result may not be particularly large or important.
- 2. Can a test of significance test help answer any of the following questions? Discuss with your group.
 - (a) If the experiment is well designed.
 - (b) If the observed result is consistent with the null hypothesis
 - (c) If the observed effect is important.
- 3. A one sided significance test of the null hypothesis of $\mu = 50$ is carried out. Suppose that if the actual mean is $\mu = 60$ the test has a power of 0.5. Would the power be higher, lower, or the same if the actual mean was $\mu = 70$? Draw a diagram to illustrate your answer.

- 4. A machine is designed to fill bags of sugar so that the net weight of sugar in each bag is 1.0 kg on average, with a standard deviation of 0.09 kg. Suppose that unbeknownst to the manger the machine has gone out of alignment slightly and now adds an average of 1.04 kg of sugar to the bags.
 - (a) What is the effect size.
 - (b) As part of a regular checkup on the machine a sample of 16 bags is taken to test whether the machine is adding too much. State a null hypothesis for this test and an alternative hypothesis.
 - (c) If the mean of the sample happens to be small enough the manager many erroneously conclude that the machine does not need adjusting. What type of error is this?

(d) Suppose he measures a sample mean of 1.025 kg. Will he conclude he needs to adjust the machine at the 0.05 level of significance?

(e) Show that a sample will only show enough evidence that the machine needs to be adjusted if its mean is bigger than 1.033 kg. Assume a 0.05 significance level.

(f) Given that the machine actually does need adjusting how likely is it that a sample of 16 bags would have such a small mean? Hence find the power of the significance test.

(g) The manager decides that sampling 16 bags does not provide a powerful enough test. Repeat the previous two parts of this question with a sample size of 25, and hence find the new power.