ECO220Y: Homework, Lecture 13 - SOLUTIONS

(1) Draw a table similar to the one we saw in lecture 13:

	H_0 is true state of the world (Patient has a disease)	H_0 is not true state of the world (Patient is healthy)
Reject H_0 (conclude that patient is healthy)	Type I error	No error
Fail to reject H_0 (conclude that patient has a disease)	No error	Type II error

Type I error is considered to have more serious consequences, so usually the null and alternative hypotheses are constructed in such a way that Type I error states what we would prefer to avoid happening by all means. Since disease is seldom serious, but the treatment is less expensive if the disease is detected early, then the doctor would prefer to diagnose a disease when a patient is in fact healthy rather than conclude that the patient is healthy while s/he has a disease. So the doctor would prefer to commit Type II error, i.e. he would prefer to err that a patient has a disease while a patient in fact is healthy. You can fill the table now with the null and alternative hypotheses statements.

(2) The forecaster will be embarrassed if he predicts the win while in fact the incumbent would lose the election. In other words, he would be embarrassed to commit Type I error. "A race is too close to call" means that the voters are equally divided with the population proportion of voters who favour the incumbent being close to 0.5. "Poll's results are not decisive" means that the forecaster was not able to find evidence in favour of the alternative hypothesis, and it also does not mean that the null is true. To safeguard himself, the forecaster should set the null to exactly 50 percent. If the race is too close to call, it would be hard to falsely reject the null even if the sample size of the poll is small. Another thing to keep in mind is that we as a rule set the null hypothesis with the "=" sign rather than with ">" or "<" signs.

(3) For this question, you are required to draw a graph without specifying critical value because I did not provide you with the significance level of the test. I did not indicate the probability of Type I error on the graph, but it is the tail of the distribution with mean 0.3 to the right of the critical value.