Do Storks Deliver Babies?

## Question 1:

In the paper, Matthews achieves a correlation of 0.62 and a t-statistic of 3.06 which for data with 15 degrees of freedom results in a p-value of 0.008. Under the definition of p-values, he is therefore stating that there is only an 0.8% chance of obtaining a value this extreme (3.06) if the null hypothesis is true. Therefore, he is statistically able to reject the null hypothesis that there is no relation between storks and birth rates and accept the alternative hypothesis that there is a relationship.   
However, this p-value does not truly imply that there is a 99.2% probability that storks deliver babies and a more logical explanation for this value is the existence of a confounding variable. That is, an external variable that affects both storks numbers and birth rate which makes them appear correlated. The p-value of this test is only relating to the correlation coefficient, this is not causation and so these two variables are correlated this is different to causation and so we cannot state that a high number of storks results in a higher birth rate.

## Question 2:

The correlation coefficient is used to test whether variables have a relationship and the strength of this relationship. It exists in a range of -1 to 1, with -1 being negatively correlated and indicating that as one variable increases, the other decreases. 1 is positively correlated and indicates that as one variable increases, the other increases. A correlation coefficient of 0 indicates no correlation and if plotted on a scatter graph there would be no obvious pattern. Highly correlated variables should lead to a good regression fit as most of the variance within the target variable should be predicted by the predictor variable.

P-values display the probability that you would receive results of this extremity (from a statistical test) if the null value was true. If you reject the null hypothesis, then you are claiming that your results are statistically significant. However, this is set by a threshold decided by a human and therefore may in some circumstances be considered arbitrary. If you have a threshold of 95% and a low p-value of 0.03, you are claiming that there is only a 3% chance of obtaining a value this extreme and because of the threshold you have set, this is classed as statistically significant. A p-value cannot tell you whether your regression is a good fit, it is more an indicator of repeatability. If you repeated this experiment many times (for the values set above), you would expect your value to be this extreme 3% of the time if the null hypothesis is correct.

## Question 3:

The example in the paper of storks and birth rates explains how correlation and causation can be confused with one another.