7A Hypothesis Testing

1. Imagine we believe that a dice is biased towards landing on 6s.
   We roll the dice 20 times and get a 6 on 8 occasions

a) What is the test statistic for this situation?

b) Write a sensible null hypothesis for this situation

c) Write a sensible alternative hypothesis for this situation

d) A researcher wants to test, at the 5% significance level, whether the dice is biased
Under what conditions would we reject the null hypothesis?

e) What is the probability of getting 8 sixes when rolling a dice 20 times?

Imagine we had rolled 7 sixes instead…

Imagine we had rolled 6 sixes instead…

2. John wants to see whether a coin is unbiased, or whether it is biased towards coming down on heads. He tosses the coin 8 times and counts the numbers of times, X, that it lands heads up.

a) Describe the test statistic

b) Write down a suitable null hypothesis

c) Write down a suitable alternative hypothesis

3. An election candidate believe she has the support of 40% of the residents in a particular town. A researcher wants to test, at the 5% significance level, whether the candidate is overestimating her support. The researcher asks 20 people whether they support the candidate, and 3 say that they do.

a) Write down a suitable test statistic

b) Write down two suitable hypotheses

c) Explain the condition under which the null hypothesis would be rejected