Homework 2

Reporting a binomial test

a. Data from Bresnan et al. (2007) yielded a total of 2360 instances of dative constructions, where 501 represent prepositional datives. This number represents successful trials.

b. The hypothesized probability of success = .5

c. 95 percent confidence interval:
0.1959431 0.2293504

d. The test is significant at α = .05, p-value < 2.2e-16

List of *R* expressions

```
> x <- 501
> n <- 501 + 1859
> n
> binom.test(x, n, .5)
```

McNemar's test

```
> PTB <- read.delim("PTB.tsv", TRUE, stringsAsFactors = FALSE)
> PTB
   gold.tag      TnT.tag        Collins.tag     Stanford.tag   LAPOS.tag      NLP4J.tag
1       JJ          JJ              JJ              JJ             JJ              JJ
2      NNS         NNS             NNS             NNS            NNS             NNS
3       IN          IN              IN              IN             IN              IN
…

> gold <- PTB[,1]
> gold
> stanford <- PTB[,4]
> stanford
NLP4J <- PTB[,6]
NLP4J
> gold == stanford
[1]  TRUE  TRUE  TRUE  TRUE  TRUE  TRUE  TRUE  TRUE  TRUE  TRUE  TRUE  TRUE
[13]  TRUE  TRUE  TRUE  TRUE  TRUE FALSE  TRUE  TRUE  TRUE  TRUE  TRUE  TRUE
…
> stanford.correct <- gold == Stanford
> gold == NLP4J
 [1]  TRUE  TRUE  TRUE  TRUE  TRUE FALSE  TRUE  TRUE  TRUE  TRUE  TRUE  TRUE
```

```
 [13]  TRUE  TRUE  TRUE  TRUE  TRUE FALSE  TRUE  TRUE  TRUE  TRUE  TRUE  TRUE
 …

> NLP4J.correct <- gold == NLP4J
> !NLP4J.correct
 [1] FALSE FALSE FALSE FALSE FALSE  TRUE FALSE FALSE FALSE FALSE FALSE FALSE
 [13] FALSE FALSE FALSE FALSE FALSE  TRUE FALSE FALSE FALSE FALSE FALSE FALSE
 …

> stanford.wins <- stanford.correct & !NLP4J.correct
> table(stanford.wins)
  stanford.wins
 FALSE   TRUE
 128696    943

> stanford.wins <- sum(stanford.correct & !NLP4J.correct)
> stanford.wins
[1] 943

> NLP4J.wins <- sum(NLP4J.correct & !stanford.correct)
> NLP4J.wins
[1] 1016

> x <- 943
> n <- 943 + 1016
> n
[1] 1959
> binom.test(x, n, .5)

        Exact binomial test

data:  x and n
number of successes = 943, number of trials = 1959, p-value = 0.1038
alternative hypothesis: true probability of success is not equal to 0.5
95 percent confidence interval:
 0.459029 0.503763
sample estimates:
probability of success
        0.481368
```

Based on the p-value, we fail to reject the null hypothesis, i.e., there is no significant difference between the two taggers.