Assignment 3

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Reaction times were recorded for 13 individuals under the influence of either drug A or drug B, giving the following data:

- Drug A: 2.07 1.71 2.24 1.62 2.11
- Drug B: 2.41 1.96 1.93 2.71 2.50 2.84 2.88 2.43

a)

Use R to carry out a Mann-Whitney U-test on these data.

```
drug.a <- c(2.07, 1.71, 2.24, 1.62, 2.11)
drug.b <- c(2.41, 1.96, 1.93, 2.71, 2.50, 2.84, 2.88, 2.43)

wilcox.test(drug.a, drug.b, alternative='two.sided', exact=TRUE)
```

```
##
##  Wilcoxon rank sum test
##
## data:  drug.a and drug.b
## W = 6, p-value = 0.04507
## alternative hypothesis: true location shift is not equal to 0
```

Suppose $drug.a$ is a random sample from the random variable X, while $drug.b$ is a random sample from the random variable Y.

$H_0 : X, Y$ have the same distribution

$H_1 : X, Y$ don't have the same distribution

The assumptions for this test are:

1. X and Y are independent -which is true since the are different patients.
2. The observations are at least ordinal -which is true since the data are times, and therefore continuous ratio data.

Our data have no ties in them, therefore the p-value calculated is exact and does 't rely on a Normal approximation. Since the p-value of the test is 0.04507 the results are not significant on an $\alpha = 5\%$ level. Therefore we **reject** the null hypothesis.

b)

Use R to carry out a two-sample randomisation test, based on sample means, to assess whether the effects of the two drugs differ, and state your conclusions.

c)

Will the *p-value* calculated in part (b) differ to one calculated by enumerating all permutations at least as extreme as the observed one? Explain your answer.