On Average, are Diamonds Certified by HRD Priced Higher than those Certified by Other Organizations?

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1 The Hypotheses

Let us state our Hypotheses:

- Null Hypothesis (H_0) : On average, there is no difference in diamond's pricing, between HRD or any other organization
- Alternate Hypothesis (H_A): On average, HRD certified diamonds are priced higher (one-sided test)

Mathematically, the hypothese are expressed below:

- H_0: $_{\text{diff}} = 0$
- H_A: $_{\text{diff}} > 0$

2 The Data

We separate the data sets - diamonds certified by HRD and other diamonds. There are `79` observations of HRD Diamonds and `229` non-HRD Certified Diamonds.

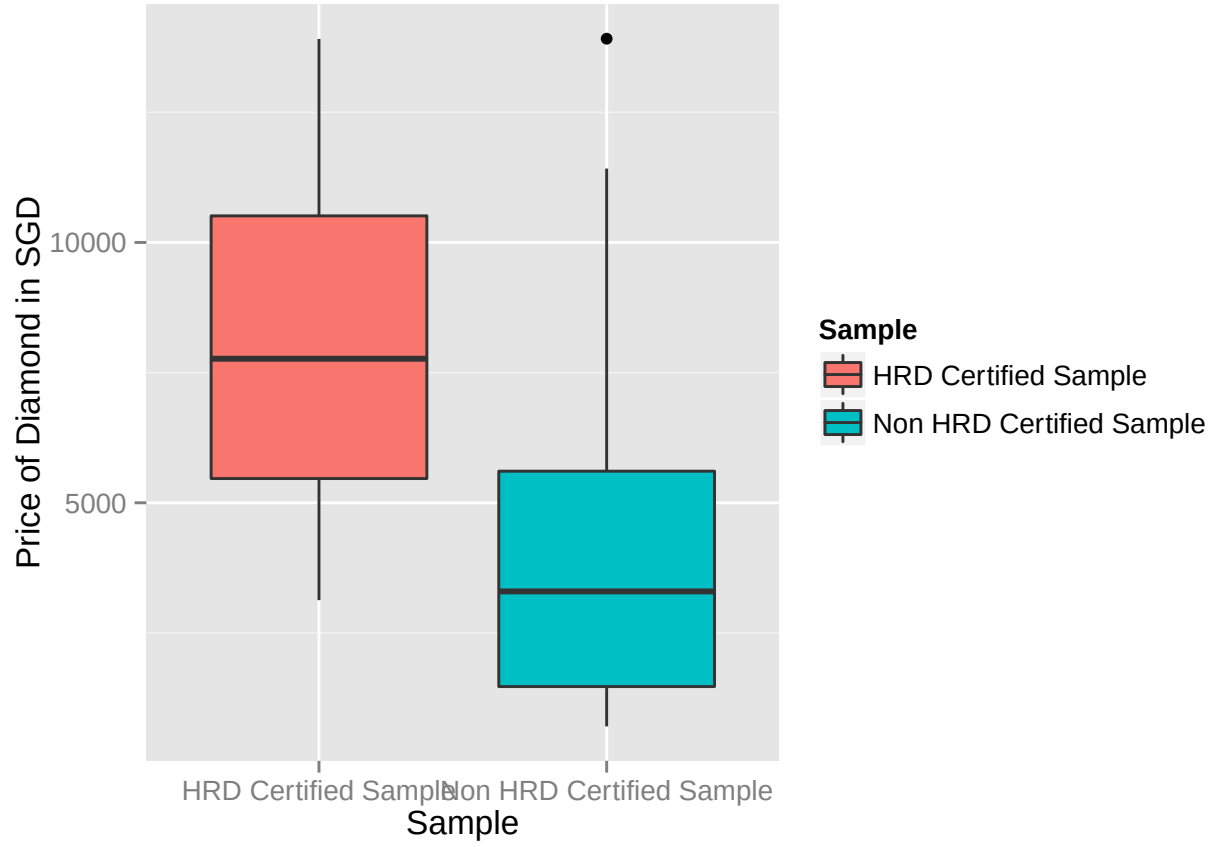
3 Central Limit Theorm: Checking the Conditions for Hypothesis Testing for Paired Data

The conditions for hypothesis testing:

- Independence: Sampled observations must be independent. Random sample must be collected with replacement because the size of HRD Certified diamond is small
- Sample Size / Skew: The no of elements must be more than 30.

We select a size of 40 with replacement.


0.00015
0.00010
0.00005
0.00000
Density
5000
10000
Price of Diamond in SGD
Sample
HRD Certified Sample
Non HRD Certified Sample


10000
5000
Price of Diamond in SGD
HRD Certified Sample
Non HRD Certified Sample
Sample
Sample
HRD Certified Sample
Non HRD Certified Sample

4 The Test Statistic

```
zScore <- xBar / standardError(Diff)
zScore
```

```
## [1] 5.758039
```

```
# Calculating p-value
# 1-pnorm() because we are doing a one-sided test - greater than
pValue <- 1-pnorm( zScore )
pValue
```

```
## [1] 0.000000004254841
```

5 Null Hypothesis (H_0) is Rejected

The **Null Hypothesis (H_0)** is rejected because the pValue is lesser than the significance value of 0.05.