Lab02

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# AIM: Testing of hypothesis when sd is known, i.e, Z TEST

## Dataset:

netflix\_dataset <- read.csv("C:/Users/Siddhartha/Desktop/Data Science/PRACTICALS/MScDSB-MDS272-23122133-Siddhartha/Lab 2/netflix\_dataset.csv")

Here, we imported the external data set in csv format.

## Top 6 rows:

head(netflix\_dataset)

## index id title type  
## 1 0 tm84618 Taxi Driver MOVIE  
## 2 1 tm127384 Monty Python and the Holy Grail MOVIE  
## 3 2 tm70993 Life of Brian MOVIE  
## 4 3 tm190788 The Exorcist MOVIE  
## 5 4 ts22164 Monty Python's Flying Circus SHOW  
## 6 5 tm14873 Dirty Harry MOVIE  
## description  
## 1 A mentally unstable Vietnam War veteran works as a night-time taxi driver in New York City where the perceived decadence and sleaze feed his urge for violent action, attempting to save a preadolescent prostitute in the process.  
## 2 King Arthur, accompanied by his squire, recruits his Knights of the Round Table, including Sir Bedevere the Wise, Sir Lancelot the Brave, Sir Robin the Not-Quite-So-Brave-As-Sir-Lancelot and Sir Galahad the Pure. On the way, Arthur battles the Black Knight who, despite having had all his limbs chopped off, insists he can still fight. They reach Camelot, but Arthur decides not to enter, as "it is a silly place".  
## 3 Brian Cohen is an average young Jewish man, but through a series of ridiculous events, he gains a reputation as the Messiah. When he's not dodging his followers or being scolded by his shrill mother, the hapless Brian has to contend with the pompous Pontius Pilate and acronym-obsessed members of a separatist movement. Rife with Monty Python's signature absurdity, the tale finds Brian's life paralleling Biblical lore, albeit with many more laughs.  
## 4 12-year-old Regan MacNeil begins to adapt an explicit new personality as strange events befall the local area of Georgetown. Her mother becomes torn between science and superstition in a desperate bid to save her daughter, and ultimately turns to her last hope: Father Damien Karras, a troubled priest who is struggling with his own faith.  
## 5 A British sketch comedy series with the shows being composed of surreality, risquÃ© or innuendo-laden humour, sight gags and observational sketches without punchlines.  
## 6 When a madman dubbed 'Scorpio' terrorizes San Francisco, hard-nosed cop, Harry Callahan â€“ famous for his take-no-prisoners approach to law enforcement â€“ is tasked with hunting down the psychopath. Harry eventually collars Scorpio in the process of rescuing a kidnap victim, only to see him walk on technicalities. Now, the maverick detective is determined to nail the maniac himself.  
## release\_year age\_certification runtime imdb\_id imdb\_score imdb\_votes  
## 1 1976 R 113 tt0075314 8.3 795222  
## 2 1975 PG 91 tt0071853 8.2 530877  
## 3 1979 R 94 tt0079470 8.0 392419  
## 4 1973 R 133 tt0070047 8.1 391942  
## 5 1969 TV-14 30 tt0063929 8.8 72895  
## 6 1971 R 102 tt0066999 7.7 153463

Here we can see the top 6 rows of the data set.

## Bottom 6 rows

tail(netflix\_dataset)

## index id title type  
## 5278 5277 tm1004011 Time to Dance MOVIE  
## 5279 5278 tm1040816 Momshies! Your Soul is Mine MOVIE  
## 5280 5279 tm1014599 Fine Wine MOVIE  
## 5281 5280 tm1045018 Clash MOVIE  
## 5282 5281 tm1098060 Shadow Parties MOVIE  
## 5283 5282 ts271048 Mighty Little Bheem: Kite Festival SHOW  
## description  
## 5278 When a ballroom dancerâ€™s shot at a crucial tournament is jeopardized, a street dancer must face his own painful past and step up as her new partner.  
## 5279 Three women with totally different lives accidentally get their souls switched as they struggle with the comedic misadventures of their new worlds, they realize that their own lives and families are worth loving and living for. Jolene, a famous person who always has fans in public, Mylene - an overprotected lady who always gets pleasure and love and Karlene - a rich famous social media influencer all switch bodies but their lives did not just change, but their souls switched that leaves them with no choice but to stick together to live the peculiar lives of each other. Karlene then has to convince a group of investors to invest in her near-bankrupt hotel, but no one believes her because she is trapped in Myleneâ€™s body. In the process of all of their imaginative scenarios, they drew closer to each other into becoming the soul sisters they are destined to be.  
## 5280 A beautiful love story that can happen between two people regardless of their age gaps.  
## 5281 A man from Nigeria returns to his family in Canada and discovers that Western culture has changed his children in ways that he does not approve.  
## 5282 A family faces destruction in a long-running conflict between communities that pits relatives against each other amid attacks and reprisals.  
## 5283 With winter behind them, Bheem and his townspeople usher in a sunny new season in all their favorite ways during the Makar Sankranti festival.  
## release\_year age\_certification runtime imdb\_id imdb\_score imdb\_votes  
## 5278 2021 107 tt8622232 2.2 950  
## 5279 2021 108 tt14412240 5.8 26  
## 5280 2021 100 tt13857480 6.9 39  
## 5281 2021 88 tt14620732 6.5 32  
## 5282 2021 116 tt10168094 6.2 9  
## 5283 2021 0 tt13711094 8.8 16

Here we can see the bottom 6 rows of the data set.

## Dimension:

dim(netflix\_dataset)

## [1] 5283 11

Here we can see that we have 5283 rows and 11 columns in our imported data set.

## Summary:

summary(netflix\_dataset)

## index id title type   
## Min. : 0 Length:5283 Length:5283 Length:5283   
## 1st Qu.:1320 Class :character Class :character Class :character   
## Median :2641 Mode :character Mode :character Mode :character   
## Mean :2641   
## 3rd Qu.:3962   
## Max. :5282   
##   
## description release\_year age\_certification runtime   
## Length:5283 Min. :1953 Length:5283 Min. : 0.0   
## Class :character 1st Qu.:2015 Class :character 1st Qu.: 45.0   
## Mode :character Median :2018 Mode :character Median : 87.0   
## Mean :2016 Mean : 79.2   
## 3rd Qu.:2020 3rd Qu.:106.0   
## Max. :2022 Max. :235.0   
##   
## imdb\_id imdb\_score imdb\_votes   
## Length:5283 Min. :1.500 Min. : 5   
## Class :character 1st Qu.:5.800 1st Qu.: 521   
## Mode :character Median :6.600 Median : 2279   
## Mean :6.533 Mean : 23407   
## 3rd Qu.:7.400 3rd Qu.: 10144   
## Max. :9.600 Max. :2268288   
## NA's :16

Here we can see that we have the minimum value, the first quartile, the second quartile (i.e, the median), the third quartile, the maximum value and the mean for each of the columns having numerical values.

## Defining population:

population = netflix\_dataset$imdb\_score  
population

## [1] 8.3 8.2 8.0 8.1 8.8 7.7 7.8 5.8 7.7 7.3 7.5 7.6 8.1 6.9 7.5 7.5 7.2 7.5  
## [19] 6.2 7.6 6.4 6.7 7.2 6.8 9.0 6.7 2.1 7.4 8.1 7.2 6.9 6.5 6.5 6.2 7.8 6.2  
## [37] 6.7 6.2 6.8 4.6 4.2 5.1 6.9 8.9 8.1 8.3 7.7 6.7 8.3 6.7 7.4 6.9 7.8 6.5  
## [55] 6.6 6.5 7.1 6.7 7.6 4.9 6.7 6.4 6.1 7.4 7.2 7.3 7.2 6.0 7.9 6.0 6.0 8.0  
## [73] 7.7 7.6 8.1 6.7 7.0 6.5 7.2 5.6 6.6 8.7 7.1 6.5 6.3 5.1 5.8 4.8 6.1 6.3  
## [91] 6.2 3.8 6.1 5.2 5.4 7.3 6.3 6.5 7.4 8.4 7.6 8.8 7.0 8.8 8.6 8.9 8.1 7.8  
## [109] 7.8 8.2 7.1 6.7 7.3 8.5 7.8 7.7 6.5 6.5 6.2 6.6 6.4 7.1 7.5 7.2 7.3 7.6  
## [127] 7.2 7.9 6.9 7.5 7.1 6.8 7.2 6.5 6.0 4.5 7.2 6.6 5.6 7.3 4.8 6.9 6.5 5.7  
## [145] 6.0 3.8 5.8 5.4 8.0 5.2 5.6 5.9 6.2 7.0 4.7 6.4 4.5 4.7 4.7 6.5 5.7 6.2  
## [163] 8.0 6.5 6.6 7.2 4.5 7.9 6.8 6.8 8.5 7.0 7.1 7.9 6.4 6.7 7.6 7.4 7.4 7.8  
## [181] 5.9 7.8 7.5 4.7 7.1 4.0 7.2 8.1 7.6 7.6 4.8 5.4 6.5 6.2 9.0 6.2 7.6 5.5  
## [199] 6.1 6.4 5.5 7.5 5.4 6.9 5.5 6.6 7.8 4.5 7.3 6.6 6.6 6.1 7.8 7.8 5.9 6.7  
## [217] 8.2 6.1 6.5 4.5 7.9 6.7 6.9 3.6 6.2 5.0 6.0 4.6 5.9 9.5 8.2 7.8 8.7 7.6  
## [235] 8.6 8.1 7.8 8.5 8.4 8.5 7.1 6.5 8.7 8.5 8.3 9.3 8.8 6.6 8.1 8.7 8.0 7.2  
## [253] 7.6 7.2 6.6 6.1 9.0 6.5 7.7 6.6 6.1 7.0 7.8 7.7 8.4 7.5 7.2 8.0 8.0 7.0  
## [271] 5.6 7.6 7.6 7.2 8.8 6.7 5.9 7.6 6.6 7.1 8.6 8.1 7.6 7.0 7.6 8.5 7.8 6.7  
## [289] 6.9 6.8 7.3 7.9 6.3 6.7 7.3 7.1 7.3 5.8 6.3 6.9 8.3 6.7 6.3 8.0 6.8 6.3  
## [307] 6.2 6.5 5.9 6.7 8.3 6.8 7.0 5.7 6.8 8.7 6.5 5.0 6.5 4.0 5.8 5.6 5.9 6.4  
## [325] 8.0 7.3 5.8 5.5 6.0 5.4 5.1 5.1 6.7 5.5 7.4 5.7 7.9 7.3 5.2 7.1 5.9 7.6  
## [343] 6.3 5.1 6.2 6.1 6.2 6.5 5.5 7.3 8.9 8.4 8.6 7.2 8.3 7.6 4.8 7.0 7.4 6.8  
## [361] 6.6 6.1 6.6 7.9 6.2 5.1 6.3 5.8 7.6 6.5 5.5 7.6 8.0 5.9 6.0 5.9 8.0 6.6  
## [379] 8.1 6.2 6.7 5.8 6.9 8.3 5.6 3.9 8.4 5.6 7.6 6.6 7.7 6.7 7.5 7.6 8.3 8.1  
## [397] 7.0 8.2 7.4 5.4 7.8 5.5 5.1 7.3 4.9 7.8 6.5 7.5 5.3 6.4 8.1 7.6 6.3 6.9  
## [415] 3.6 7.5 5.4 5.6 5.6 7.3 7.9 6.8 7.4 7.4 6.7 7.1 8.0 5.6 7.5 3.9 7.0 6.7  
## [433] 7.9 8.1 4.8 6.5 6.6 6.6 6.3 5.9 5.1 6.9 4.1 5.8 6.4 4.5 7.6 6.3 7.0 6.1  
## [451] 7.2 6.6 6.6 6.4 7.9 6.5 6.3 7.0 6.9 7.4 8.1 7.3 7.4 7.1 4.4 8.7 6.9 6.8  
## [469] 7.0 5.4 5.9 6.5 6.2 7.1 7.7 7.0 7.6 7.0 6.9 7.2 6.6 7.1 7.2 8.1 7.4 8.1  
## [487] 4.7 8.0 5.4 6.1 7.9 7.5 7.3 6.2 7.4 8.7 7.7 7.1 6.0 8.4 7.4 6.6 6.6 5.1  
## [505] 7.7 8.0 6.6 7.2 5.5 8.0 5.2 7.9 7.6 6.2 7.2 7.4 7.7 7.0 5.3 7.4 6.3 6.1  
## [523] 7.2 7.6 7.4 7.4 7.2 7.5 8.0 7.4 7.3 8.5 7.4 7.2 4.1 7.5 6.9 7.6 7.4 7.1  
## [541] 7.1 7.9 6.3 5.0 6.8 7.3 6.3 7.1 6.9 7.4 7.8 7.8 6.3 6.8 7.5 5.3 7.6 7.4  
## [559] 6.8 6.2 4.4 6.6 5.7 7.5 7.3 7.2 8.7 7.8 6.5 7.7 7.6 8.3 6.1 8.1 7.0 6.9  
## [577] 8.1 7.0 5.6 6.8 7.1 7.2 8.0 8.4 7.2 5.2 7.9 5.2 2.9 5.2 4.2 5.1 6.8 8.4  
## [595] 5.6 5.5 6.9 8.0 5.3 6.4 4.3 7.3 5.2 3.5 7.0 5.6 6.4 4.8 6.5 2.9 6.7 4.8  
## [613] 5.6 6.5 6.4 6.4 6.3 7.1 7.4 7.3 5.9 6.3 9.6 5.6 7.7 6.6 7.6 4.3 8.4 5.5  
## [631] 6.7 4.8 7.4 5.2 6.8 3.4 5.4 7.1 6.7 5.5 6.7 7.0 6.9 6.4 6.5 6.5 6.1 7.7  
## [649] 8.0 6.3 6.4 5.6 5.7 6.1 6.5 7.4 8.5 5.4 7.4 7.7 8.8 7.1 8.4 8.3 7.4 8.6  
## [667] 7.8 7.7 8.3 7.7 7.4 8.4 8.2 9.0 7.5 7.5 7.8 6.8 5.8 6.2 6.4 6.2 7.4 7.7  
## [685] 8.4 7.6 6.0 7.9 7.2 6.2 8.3 6.6 7.5 7.0 6.4 5.9 6.6 6.4 4.5 5.9 8.0 7.9  
## [703] 7.4 6.8 7.3 8.2 6.0 7.5 7.3 4.1 6.2 8.2 7.8 5.9 6.1 5.4 6.9 8.3 5.6 5.4  
## [721] 3.3 6.4 8.1 8.2 6.2 7.8 5.0 7.1 7.5 8.0 5.7 7.4 7.6 6.8 7.7 8.0 8.4 8.2  
## [739] 7.4 7.1 7.2 7.4 6.3 6.5 8.1 5.8 8.0 7.7 6.8 7.1 8.2 5.5 8.1 6.8 6.1 6.3  
## [757] 5.9 5.8 6.6 7.6 7.1 7.0 6.4 6.7 6.5 7.7 6.1 6.4 7.8 7.4 7.1 4.7 7.0 7.4  
## [775] 7.5 6.6 5.0 7.3 6.4 8.5 5.9 5.4 8.1 6.0 7.3 6.4 5.2 6.0 6.6 4.6 7.3 8.2  
## [793] 5.3 5.2 6.9 6.9 6.7 6.7 5.1 4.2 5.8 2.0 6.9 7.6 5.5 7.2 6.6 5.1 7.2 6.0  
## [811] 6.3 6.2 8.1 5.1 7.9 6.0 5.2 5.8 4.5 5.3 5.6 7.2 9.0 3.2 6.3 6.3 7.1 6.4  
## [829] 3.9 6.9 7.5 5.9 6.1 4.3 5.1 5.0 7.1 7.6 7.8 5.2 8.2 7.8 8.0 3.8 6.5 7.0  
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## [883] 8.8 8.7 5.6 6.5 6.5 6.4 8.1 8.3 7.8 6.3 7.2 8.0 8.6 7.6 5.3 6.3 7.9 6.4  
## [901] 6.6 6.9 5.2 8.1 6.9 7.2 5.6 7.0 3.5 7.9 6.8 7.8 6.3 8.1 8.6 7.5 6.6 4.8  
## [919] 6.3 7.5 5.9 6.8 5.4 5.1 5.5 8.1 8.3 5.7 7.1 7.1 7.9 7.3 5.8 6.9 5.5 6.3  
## [937] 6.4 5.7 6.9 5.6 5.6 7.1 6.1 8.0 7.5 7.7 7.7 5.6 8.3 5.3 7.1 6.0 5.6 7.3  
## [955] 6.4 7.1 8.2 7.5 5.2 7.3 8.0 7.6 5.1 7.8 8.3 5.0 4.6 7.4 6.2 6.9 6.0 5.8  
## [973] 8.1 7.3 8.2 6.5 6.4 6.7 6.1 6.8 6.0 8.2 7.7 6.6 6.1 6.4 6.8 7.6 4.8 6.2  
## [991] 6.5 4.6 7.3 6.6 7.5 8.6 4.3 6.8 8.1 6.9 7.0 7.3 4.0 6.4 7.3 7.9 6.3 6.5  
## [1009] 7.6 7.2 7.6 8.2 6.7 6.1 7.0 8.5 8.6 7.6 7.9 6.3 5.0 6.4 7.8 6.6 7.8 7.1  
## [1027] 6.9 3.9 6.9 7.0 6.8 6.2 8.0 9.0 5.3 7.6 7.6 4.8 6.9 8.2 7.2 8.0 4.6 5.4  
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## [1099] 7.4 5.3 5.2 1.7 7.2 5.2 6.4 3.9 5.6 8.3 6.7 5.8 6.3 7.8 7.3 7.3 6.9 6.3  
## [1117] 5.5 2.9 5.5 5.7 6.2 7.4 4.9 7.0 2.6 8.0 6.6 7.1 6.9 8.6 3.8 6.9 4.0 7.4  
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## [1189] 7.5 9.0 7.9 7.8 7.3 6.3 7.5 7.1 7.9 7.3 7.6 7.2 6.2 7.8 8.1 7.9 5.4 7.4  
## [1207] 5.9 6.3 7.6 8.3 6.8 6.9 8.2 7.1 8.0 7.6 6.6 8.5 8.1 7.3 7.7 7.1 5.5 7.2  
## [1225] 7.4 6.7 6.0 7.4 7.5 6.6 7.6 7.3 7.7 7.5 8.3 7.6 6.8 7.4 7.0 6.7 6.9 7.3  
## [1243] 8.6 7.1 6.4 6.6 5.3 6.6 6.2 8.0 7.3 8.3 8.2 6.4 6.3 6.3 5.3 6.8 6.6 8.2  
## [1261] 6.1 7.6 6.3 7.5 6.1 7.6 7.1 7.0 6.2 4.3 6.8 7.7 8.4 7.9 6.5 6.7 8.5 8.4  
## [1279] 7.3 7.6 8.4 6.0 4.8 5.3 7.2 7.0 6.5 5.9 7.6 7.2 7.0 7.1 7.1 5.9 8.4 8.2  
## [1297] 7.3 7.6 6.3 8.2 5.5 8.4 6.1 6.3 7.2 7.7 8.1 6.0 5.6 7.2 7.3 7.3 5.5 5.7  
## [1315] 7.3 7.1 6.1 4.8 5.8 4.1 5.8 6.3 5.7 8.4 6.7 6.9 7.5 7.0 7.6 6.9 5.8 7.4  
## [1333] 8.0 6.9 6.7 5.3 7.8 6.6 8.4 8.4 8.6 6.0 8.4 6.2 5.4 4.6 9.2 6.6 7.5 5.7  
## [1351] 7.0 6.3 6.2 8.2 7.7 6.4 7.3 8.2 8.2 6.8 5.9 6.0 7.2 5.5 6.9 8.7 8.2 7.0  
## [1369] 5.5 7.4 6.7 5.9 4.1 6.5 5.4 6.0 6.1 5.2 7.4 5.6 7.5 8.2 7.4 7.9 7.3 5.7  
## [1387] 6.7 5.5 5.7 5.7 4.5 5.3 7.2 5.9 7.2 4.5 6.1 6.1 6.7 8.1 6.6 7.9 6.8 8.3  
## [1405] 5.8 5.9 6.6 7.5 5.0 8.1 6.8 6.5 7.6 6.8 5.8 6.0 6.8 6.6 7.8 5.3 6.1 7.7  
## [1423] 6.9 7.4 8.0 5.3 7.7 4.1 6.7 7.1 7.9 5.5 7.6 7.9 5.6 6.8 7.4 6.4 7.9 4.9  
## [1441] 7.2 7.3 5.1 5.7 8.1 8.3 6.8 8.4 7.4 3.6 8.1 6.7 5.6 7.8 6.6 7.4 6.2 7.7  
## [1459] 6.3 5.7 5.7 3.1 7.4 6.1 7.7 6.2 6.4 7.1 5.6 7.4 5.8 7.3 6.5 6.0 5.9 6.2  
## [1477] 7.7 6.7 8.3 5.4 5.4 6.9 6.3 7.1 6.3 8.2 7.6 6.9 7.8 7.4 5.9 6.7 7.5 7.0  
## [1495] 5.7 7.0 7.1 7.5 8.8 8.4 7.2 5.6 7.7 5.8 6.2 8.0 6.9 7.1 6.8 7.3 6.2 7.3  
## [1513] 6.7 6.0 5.3 6.5 7.5 7.1 6.6 4.4 7.6 7.3 6.3 7.1 6.3 5.0 6.1 5.9 7.4 6.9  
## [1531] 7.2 7.9 7.5 7.3 6.4 6.1 5.8 5.5 8.8 3.7 6.3 6.1 6.5 5.9 7.9 6.2 6.6 6.1  
## [1549] 5.8 5.1 8.1 5.8 6.6 7.0 7.2 5.1 1.9 5.0 6.5 7.3 6.5 7.7 2.8 7.1 2.7 7.4  
## [1567] 7.2 7.3 5.4 6.8 6.8 6.2 6.3 5.7 5.4 6.8 5.3 6.0 7.8 6.7 7.0 6.6 5.9 7.5  
## [1585] 5.4 6.8 6.6 7.0 5.0 8.4 7.2 5.9 7.7 7.3 6.9 5.2 6.5 5.5 7.5 6.4 4.7 7.3  
## [1603] 6.6 8.3 3.6 7.5 5.1 5.6 6.2 7.1 7.4 5.1 6.4 7.5 6.6 4.8 6.6 4.5 4.8 6.5  
## [1621] 5.9 3.8 5.2 5.6 4.4 6.2 7.2 7.0 5.0 6.6 7.9 4.7 6.8 5.4 6.8 7.0 6.8 6.2  
## [1639] 6.4 8.6 5.0 6.6 6.4 6.3 6.1 6.7 6.1 8.4 4.5 6.5 7.3 7.4 4.8 5.7 6.1 4.1  
## [1657] 5.5 6.4 5.5 5.5 5.5 7.2 6.4 6.7 1.5 7.4 6.0 5.8 4.4 5.2 6.3 5.2 6.9 6.6  
## [1675] 5.1 7.6 7.2 6.8 6.7 6.7 6.5 7.7 6.9 6.9 4.8 5.7 6.3 7.1 4.3 4.5 5.0 6.4  
## [1693] 6.6 3.7 4.8 2.7 7.2 5.6 7.4 6.5 5.3 4.5 5.8 6.2 8.0 5.4 6.0 5.1 5.4 6.0  
## [1711] 2.1 5.1 6.3 6.9 5.5 6.1 6.2 6.0 6.0 5.3 8.5 8.4 7.9 8.0 8.7 6.9 7.8 7.7  
## [1729] 7.4 6.7 7.3 8.6 7.0 7.6 7.4 7.1 7.4 8.6 7.7 7.3 8.3 7.4 7.7 6.3 8.1 7.6  
## [1747] 7.9 7.7 7.3 7.4 8.4 4.5 8.6 8.1 7.8 7.3 8.1 8.2 7.9 5.0 7.2 7.3 7.8 8.7  
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## [4141] 6.3 5.0 6.4 8.8 6.2 6.0 8.0 5.8 6.5 7.5 5.9 6.3 4.8 4.7 6.0 7.2 6.7 6.0  
## [4159] 5.1 6.1 6.8 7.3 7.0 5.7 6.2 6.4 5.7 5.6 5.5 7.2 6.0 5.5 4.4 4.4 7.6 3.4  
## [4177] 5.9 6.2 5.2 3.2 5.7 7.8 7.2 6.3 7.1 7.0 7.4 5.8 6.7 6.8 3.8 7.3 7.3 6.7  
## [4195] 5.3 6.6 6.5 5.0 5.2 8.3 5.7 5.2 5.8 5.8 4.0 7.7 4.7 5.3 7.8 6.8 6.1 6.8  
## [4213] 4.0 7.0 5.8 5.0 7.5 5.7 6.2 6.8 7.7 6.8 4.5 6.2 6.9 3.0 6.5 5.9 6.7 6.2  
## [4231] 5.5 4.7 7.2 7.2 4.2 6.8 6.1 8.0 4.6 7.5 7.3 6.6 5.3 7.2 2.7 7.0 6.1 6.7  
## [4249] 3.2 5.6 4.9 4.5 7.4 6.4 7.0 6.4 7.0 6.9 5.7 7.6 5.5 5.9 4.3 4.3 7.9 6.4  
## [4267] 6.7 8.5 4.6 6.5 2.9 4.9 7.6 6.5 6.3 7.7 8.1 6.4 6.8 6.8 3.7 6.7 8.1 5.8  
## [4285] 8.4 7.8 8.3 6.9 5.8 5.5 7.4 5.9 5.3 3.3 5.5 7.4 7.5 6.2 5.7 8.1 7.3 7.8  
## [4303] 6.8 7.3 4.2 7.1 7.0 5.5 4.7 6.4 5.2 6.4 6.2 6.5 6.2 7.0 6.6 5.7 4.9 6.1  
## [4321] 5.9 5.3 5.6 5.9 7.2 6.4 4.8 4.7 7.7 6.9 6.6 6.6 6.4 5.5 6.9 5.2 7.1 5.9  
## [4339] 7.2 3.7 5.0 5.9 5.5 7.0 5.9 5.0 6.3 7.2 6.5 6.2 5.1 7.0 6.3 6.6 6.9 6.6  
## [4357] 6.1 5.2 4.5 5.8 5.9 5.0 5.6 2.5 5.8 7.1 8.4 5.1 4.3 5.6 7.0 6.6 7.7 5.6  
## [4375] 6.4 6.2 6.3 5.6 6.2 7.5 8.0 5.4 4.9 7.7 7.8 3.6 5.9 7.8 7.4 6.8 6.2 7.4  
## [4393] 6.7 6.3 7.4 6.1 7.1 6.8 5.8 7.8 4.7 6.8 5.9 6.9 2.8 5.7 2.6 7.1 6.4 7.7  
## [4411] 5.5 6.4 4.4 5.0 7.0 8.9 6.1 6.8 6.7 6.9 6.9 6.4 4.7 6.7 7.2 4.7 5.6 7.0  
## [4429] 7.1 9.1 5.7 7.5 6.1 5.8 7.7 7.2 6.9 7.5 5.4 7.3 6.1 6.3 7.3 6.2 6.7 8.0  
## [4447] 6.2 5.6 6.1 6.5 6.7 2.5 4.9 7.6 6.3 6.9 8.4 6.3 7.0 7.6 7.5 8.0 6.5 6.5  
## [4465] 7.1 7.2 7.5 7.0 6.8 7.3 5.6 7.2 7.0 5.7 6.0 7.7 5.4 7.1 7.5 5.7 4.3 6.6  
## [4483] 7.4 7.5 7.1 6.3 5.7 7.2 6.9 7.8 5.8 7.2 8.1 6.6 6.2 6.1 7.8 7.7 6.8 7.4  
## [4501] 4.8 6.7 7.4 7.6 7.3 5.6 6.4 6.0 5.5 7.8 7.2 6.9 5.4 7.7 6.9 5.7 8.4 8.1  
## [4519] 7.5 7.8 7.5 6.8 8.7 8.3 6.5 7.3 5.8 7.7 7.6 7.9 7.1 5.4 6.3 7.0 6.2 6.8  
## [4537] 7.0 5.0 5.5 7.0 8.7 6.2 5.7 7.4 6.2 8.0 5.0 5.3 5.3 5.7 6.9 4.7 5.8 8.2  
## [4555] 6.0 7.0 7.0 5.9 4.6 7.8 5.3 8.0 6.2 6.4 7.4 4.6 6.4 7.8 5.2 7.1 8.1 5.3  
## [4573] 7.5 6.3 6.6 7.3 7.2 7.3 4.8 4.9 8.4 6.6 6.1 6.8 6.3 5.7 5.3 6.8 2.5 7.1  
## [4591] 6.8 6.8 7.2 6.7 7.5 6.7 5.6 7.2 6.2 4.0 8.1 5.4 5.9 6.5 7.1 5.5 5.6 7.0  
## [4609] 3.0 7.1 6.3 7.9 8.5 5.6 5.3 4.5 7.2 7.1 6.1 6.5 6.6 6.0 4.3 8.0 7.1 6.8  
## [4627] 5.7 6.2 9.2 6.2 7.9 8.0 6.5 6.9 6.8 4.6 6.7 6.0 7.1 6.8 6.4 7.0 8.0 4.8  
## [4645] 5.8 6.6 7.1 8.1 1.6 6.6 5.8 6.7 7.4 6.4 6.5 5.4 7.0 6.5 6.5 7.3 5.6 6.3  
## [4663] 6.6 6.2 5.5 5.6 5.6 7.1 6.9 7.4 7.3 6.8 7.0 5.2 5.7 8.0 6.2 7.6 5.4 5.6  
## [4681] 6.2 5.3 6.3 6.8 6.2 7.1 7.4 7.9 5.3 7.4 5.7 7.7 5.5 6.5 5.5 5.8 7.2 6.4  
## [4699] 6.7 6.6 5.5 8.0 6.1 7.8 7.7 7.9 6.4 7.6 5.7 7.4 7.2 8.4 6.8 6.6 6.5 7.6  
## [4717] 7.1 7.1 7.2 5.6 5.2 3.9 6.8 3.6 7.0 6.6 6.9 7.1 6.6 7.2 6.1 7.3 6.6 8.1  
## [4735] 6.7 6.1 6.4 6.3 7.3 7.4 4.3 5.8 6.7 6.1 3.9 7.3 7.0 6.6 7.5 7.0 6.3 8.1  
## [4753] 6.1 7.7 4.2 4.6 6.9 6.4 5.4 4.3 7.6 6.9 7.3 7.0 7.4 6.8 6.5 6.2 8.7 6.5  
## [4771] 6.4 6.2 7.4 6.5 7.0 6.7 4.7 5.7 2.6 6.5 6.7 4.8 1.7 6.2 7.4 6.1 4.5 5.5  
## [4789] 4.4 6.7 7.0 6.4 8.6 7.2 7.4 7.2 5.5 5.4 6.2 6.9 8.3 7.5 7.0 7.1 6.6 6.6  
## [4807] 7.4 7.2 7.1 5.4 7.9 7.0 7.3 6.7 6.3 6.7 5.5 6.3 6.7 8.4 6.0 6.4 5.4 5.9  
## [4825] 7.4 4.7 7.9 5.7 7.0 6.9 7.0 7.2 6.3 4.3 6.2 7.5 6.4 7.7 7.2 6.9 5.5 6.5  
## [4843] 7.8 7.2 6.6 5.5 7.5 4.4 5.1 5.5 5.7 6.6 6.2 7.4 6.9 6.5 7.6 8.1 7.4 7.0  
## [4861] 6.1 6.2 7.4 7.3 4.6 5.3 6.6 6.8 6.9 4.7 7.9 6.8 7.4 5.5 7.4 5.5 6.9 6.3  
## [4879] 6.7 4.8 3.9 6.6 4.2 6.3 5.4 6.6 6.3 6.5 7.0 7.5 7.2 5.3 7.5 7.8 6.4 5.1  
## [4897] 5.6 7.0 5.3 6.3 7.7 7.5 6.1 5.6 6.1 6.5 6.2 6.5 4.8 6.7 4.4 7.0 7.0 7.3  
## [4915] 7.7 7.1 4.3 6.9 7.2 7.7 5.4 6.2 5.4 3.4 6.0 6.5 5.7 4.6 6.3 6.6 8.2 6.2  
## [4933] 5.2 6.1 7.2 5.9 6.5 6.7 6.7 5.3 5.3 6.8 6.7 7.6 7.7 7.2 4.7 6.5 6.1 4.2  
## [4951] 5.2 5.6 5.2 6.5 4.3 7.5 6.6 5.0 4.1 7.8 7.9 6.2 6.3 8.1 5.5 6.1 5.5 5.8  
## [4969] 6.9 6.9 5.9 5.2 4.8 7.8 7.6 5.4 6.8 5.6 5.5 5.6 6.8 6.1 6.1 4.4 7.3 7.2  
## [4987] 7.9 6.0 6.4 6.8 6.5 5.1 5.4 5.5 5.4 5.7 6.8 8.8 5.1 4.5 2.3 6.3 7.3 7.0  
## [5005] 6.1 5.1 5.5 6.5 7.5 5.5 6.1 4.7 6.8 6.9 5.9 5.2 6.9 7.2 6.8 6.8 6.8 6.7  
## [5023] 5.2 5.8 6.4 5.1 7.2 6.7 7.5 6.4 4.7 6.4 7.1 5.5 7.0 1.8 6.8 6.7 6.3 8.0  
## [5041] 6.2 6.2 8.6 6.5 6.2 6.5 6.5 5.7 6.4 6.2 6.5 7.4 7.0 6.7 2.5 3.4 6.7 7.0  
## [5059] 4.4 3.9 5.7 5.3 6.2 5.5 6.7 6.6 8.3 6.2 3.4 7.5 5.6 7.0 5.1 6.9 5.7 7.9  
## [5077] 5.7 5.9 5.5 6.3 6.2 4.9 5.3 6.4 6.4 6.3 6.0 5.8 4.9 5.2 4.7 5.3 8.4 7.1  
## [5095] 8.1 5.8 5.1 4.4 6.2 5.9 7.1 5.5 6.9 6.9 6.3 6.6 6.9 6.5 6.1 8.3 5.0 5.5  
## [5113] 5.9 5.7 4.6 6.7 6.9 7.4 4.5 6.7 7.0 5.3 6.5 6.5 4.4 7.6 5.3 6.3 5.6 7.2  
## [5131] 5.3 6.6 7.8 6.0 5.0 6.1 3.6 7.2 5.4 5.6 5.6 4.2 6.0 5.3 7.5 5.3 6.8 4.0  
## [5149] 6.4 5.6 5.3 7.5 6.6 6.9 6.8 7.4 3.7 5.4 5.9 6.1 5.1 4.4 8.0 5.2 4.9 6.7  
## [5167] 6.3 6.6 5.8 5.1 4.2 6.7 6.2 6.8 5.9 8.1 3.9 6.4 7.4 7.7 5.7 5.8 7.5 6.5  
## [5185] 4.4 4.4 8.2 5.6 7.0 7.1 6.6 6.6 5.3 5.8 6.6 7.2 5.2 3.0 7.2 5.3 6.2 6.3  
## [5203] 5.9 7.1 6.1 6.2 3.9 5.4 6.5 6.4 7.3 7.0 5.3 4.4 5.8 7.5 6.6 3.7 6.1 5.7  
## [5221] 7.0 5.0 6.7 4.3 3.8 6.0 6.8 5.5 5.4 6.9 5.7 5.2 4.9 5.4 5.6 5.0 8.0 3.4  
## [5239] 6.2 5.9 7.8 5.0 6.9 4.8 3.8 6.6 4.7 3.3 6.0 4.3 5.6 4.6 5.8 5.5 7.3 6.6  
## [5257] 3.2 6.0 7.8 7.1 4.9 2.3 4.1 7.0 5.7 6.9 5.1 5.8 5.4 5.9 6.1 4.2 4.5 4.9  
## [5275] 6.2 4.6 7.2 2.2 5.8 6.9 6.5 6.2 8.8

Here we defined our population in the imported data set where our target varaible is “imdb\_score”.

## Mean of the population:

mean(population)

## [1] 6.533447

Here we can see we have the mean imdb score as 6.533447.

## Standard deviation of the population:

sd(population)

## [1] 1.160932

Here we have the sd of our target variable as 1.160932.

## Defining the sample:

s = sample(population, 100, replace = FALSE)  
s

## [1] 6.3 6.8 7.7 4.2 7.0 8.5 7.2 6.6 6.6 6.9 7.3 5.3 4.1 3.7 7.8 6.9 6.7 6.2  
## [19] 5.7 6.6 6.2 6.5 6.1 7.0 5.3 5.2 7.5 7.7 7.3 7.8 6.0 5.8 6.5 6.8 4.3 6.1  
## [37] 4.2 5.5 6.9 7.3 6.4 7.6 5.6 5.4 6.1 7.0 8.2 5.9 5.2 3.6 6.9 7.6 8.4 7.4  
## [55] 6.2 7.6 5.0 6.5 7.1 7.5 5.6 7.4 7.6 6.5 6.4 5.8 6.9 6.4 4.1 7.6 7.0 5.8  
## [73] 5.2 7.1 6.3 7.6 6.0 6.0 6.9 6.1 6.1 6.5 5.5 7.8 7.0 5.5 7.3 6.9 6.5 6.0  
## [91] 6.9 6.7 7.1 7.1 7.6 5.5 5.7 5.6 8.1 7.1

Here we take 100 imdb scores from the population of 5283 imdb scores in a without replacement procedure.

library('BSDA')

## Loading required package: lattice

##   
## Attaching package: 'BSDA'

## The following object is masked from 'package:datasets':  
##   
## Orange

Here we install the BSDA (Basic Statistics and Data Analysis) package.

# Z TEST

## To test whether the mean is equal to 7 or not

H0: mean=7 H1: mean!=7

z.test (x=s, alternative = "two.sided", mu=7, sigma.x = sd(population), conf.level = 0.95)

##   
## One-sample z-Test  
##   
## data: s  
## z = -4.6428, p-value = 3.437e-06  
## alternative hypothesis: true mean is not equal to 7  
## 95 percent confidence interval:  
## 6.233462 6.688538  
## sample estimates:  
## mean of x   
## 6.461

Here we tried to do a two tailed Z-test where our null hypothesis is mean equal to 7 and our alternative hypothesis is mean not equal to 7. After proceeding with the test, we can see that our p value is less than 0.05, thus, we reject the null hypothesis as there is enough evidence to suggest a significant difference.

## To test whether the mean is less than 7 or not

H0: mean=7 H1: mean<7

z.test (x=s, alternative = "less", mu=7, sigma.x = sd(population), conf.level = 0.95)

##   
## One-sample z-Test  
##   
## data: s  
## z = -4.6428, p-value = 1.718e-06  
## alternative hypothesis: true mean is less than 7  
## 95 percent confidence interval:  
## NA 6.651956  
## sample estimates:  
## mean of x   
## 6.461

Here we tried to do a one tailed Z-test where our null hypothesis is mean equal to 7 and our alternative hypothesis is mean less than 7. After proceeding with the test, we can see that our p value is less than 0.05, thus, we reject the null hypothesis as there is enough evidence to suggest a significant difference.

## To test whether the mean is less than 7 or not

H0: mean=7 H1: mean>7

z.test (x=s, alternative = "greater", mu=7, sigma.x = sd(population), conf.level = 0.95)

##   
## One-sample z-Test  
##   
## data: s  
## z = -4.6428, p-value = 1  
## alternative hypothesis: true mean is greater than 7  
## 95 percent confidence interval:  
## 6.270044 NA  
## sample estimates:  
## mean of x   
## 6.461

Here we tried to do a one tailed Z-test where our null hypothesis is mean equal to 7 and our alternative hypothesis is mean greater than 7. After proceeding with the test, we can see that our p value is greater than 0.05, thus, we accept the null hypothesis as there is not enough evidence to suggest a significant difference.