**DESCRIPTIVE STATISTICS FOR THE MAKES(HONDA AND TOYOTA)**

**The MEANS Procedure**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Make | N Obs | Variable | Mean | Variance | Std Dev | Lower 95% CL for Mean | Upper 95% CL for Mean |
| Honda | 49662 | **Price**  **Year**  **Mileage**  **City mpg**  **Highway mpg** | 19804.31  2014.88  33723.94  17.7946317  23.7865370 | 35755327.98  0.9020238  426405922  57.5607911  60.3502160 | 26.8323234  0.0042618  92.6615394  0.0340448  0.0348600 | 19751.71  2014.87  33542.32  17.7279034  23.7182110 | 19856.90  2014.89  33905.55  17.8613600  23.8548630 |
| Toyota | 49127 | **Price**  **Year**  **Mileage**  **City mpg**  **Highway mpg** | 22794.60  2015.21  32665.02  16.7040731  22.4802654 | 82722914.85  0.9928105  369091505  33.2982497  42.0393807 | 41.0348445  0.0044954  86.6776050  0.0260346  0.0292528 | 22714.17  2015.20  32495.13  16.6530450  22.4229295 | 22875.03  2015.22  32834.91  16.7551012  22.5376014 |

**Descriptive Statistics of HONDA**

**The MEANS Procedure**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Variable | N | Mean | Std Dev | Minimum | Maximum |
| Price  Year  Mileage  City\_mpg  High\_mpg | 49662  49662  49662  49662  49662 | 19804.31  2014.88  33723.94  17.7946317  23.7865370 | 5979.58  0.9497493  20649.60  7.5868828  7.7685401 | 4950  2014  5  8  10 | 99999  2018  389781  132  110 |

**Descriptive Statistics of HONDA on City\_Mpg Based on Class**

**The MEANS Procedure**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Analysis Variable : City\_mpg | | | | | | | |
| Class | **N Obs** | **Median** | **Mean** | **Variance** | **Std Dev** | **Lower 95% CL for Mean** | **Upper 95% CL for Mean** |
| Compact\_Car | **4961** | 17 | 18.50 | 70.9351308 | 8.4222996 | 18.2660810 | 18.7349269 |
| Large\_Cars | **7022** | 17 | 18.525 | 80.7607016 | 8.9866958 | 18.3154047 | 18.7358627 |
| Midsize\_Station\_Wagons | **80** | 15 | 16.275 | 14.0753165 | 3.7517085 | 15.4400982 | 17.1099018 |
| Small \_Station\_Wagon | **3070** | 15 | 16.842 | 49.4866013 | 7.0346714 | 16.5930799 | 17.0909592 |
| Small\_Pickup\_Truck\_  2WD | **7106** | 15 | 16.902 | 45.3145433 | 6.7316078 | 16.7455135 | 17.0585957 |
| Small\_sport\_Utility\_Cars | **1528** | 15 | 15.776 | 16.3895873 | 4.0484055 | 15.5736834 | 15.9799815 |
| Large\_Sport\_Ucars | **10988** | 16 | 17.855 | 55.8592519 | 7.4739047 | 17.7148082 | 17.9943290 |
| Standard\_Pickup  Truck\_4WD | **11566** | 16 | 17.993 | 51.4480294 | 7.1727282 | 17.8624363 | 18.1239030 |
| Standard\_Ucars\_4WD | **560** | 17 | 18.759 | 109.0634264 | 10.4433436 | 17.8920965 | 19.6257607 |
| Two\_Seaters | **1385** | 17 | 18.088 | 45.3477265 | 6.7340721 | 17.7331254 | 18.4430479 |
| Van\_Cars | **1396** | 16 | 17.7485 | 60.9525069 | 7.8072087 | 17.3386671 | 18.1584675 |

**Descriptive Statistics of HONDA on High\_mpg** **Based on Class**

**The MEANS Procedure**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Analysis Variable : High\_mpg | | | | | | | |
| Class | **N Obs** | **Median** | **Mean** | **Variance** | **Std Dev** | **Lower 95% CL for Mean** | **Upper 95% CL for Mean** |
| Compact\_Car | **4961** | 23 | 24.6736545 | 67.8670659 | 8.2381470 | 24.4443572 | 24.9029518 |
| Large\_Cars | **7022** | 23 | 24.5944175 | 74.3063525 | 8.6201133 | 24.3927642 | 24.7960709 |
| Midsize\_Station\_Wagons | **80** | 20 | 21.7125000 | 27.6757911 | 5.2607786 | 20.5417711 | 22.8832289 |
| Small \_Station\_Wagon | **3070** | 21 | 22.7462541 | 51.7423695 | 7.1932169 | 22.4917039 | 23.0008042 |
| Small\_Pickup\_Truck\_2WD | **7106** | 21 | 22.7303687 | 50.4472043 | 7.1026195 | 22.5651999 | 22.8955375 |
| Small\_sport\_Utility\_Cars | **1528** | 20 | 21.3560209 | 31.4527339 | 5.6082737 | 21.0745977 | 21.6374442 |
| Large\_Sport\_Ucars | **10988** | 23 | 23.8704041 | 60.1064399 | 7.7528343 | 23.7254277 | 24.0153804 |
| Standard\_Pickup\_Truck\_4WD | **11566** | 23 | 24.0180702 | 58.0286401 | 7.6176532 | 23.8792275 | 24.1569129 |
| Standard\_Ucars\_4WD | **560** | 24 | 24.9660714 | 91.4818522 | 9.5646146 | 24.1721768 | 25.7599661 |
| Two\_Seaters | **1385** | 23 | 24.1018051 | 54.1088479 | 7.3558717 | 23.7140680 | 24.4895421 |
| Van\_Cars | **1396** | 23 | 23.6489971 | 59.5154183 | 7.7146237 | 23.2439579 | 24.0540364 |

**Descriptive Statistics For TOYOTA**

**The MEANS Procedure**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Variable | N | Mean | Std Dev | Minimum | Maximum |
| Price  Year  Mileage  City\_mpg  High\_mpg | 49127  49127  49127  49127  49127 | 22794.60  2015.21  32665.02  16.7040731  22.4802654 | 9095.21  0.9963988  19211.75  5.7704636  6.4837783 | 5814.00  2014.00  5.00  8.00  10.00 | 183710.00  2018.00  475636.00  128.00  110.00 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Descriptive Statistics For TOYOTA on City\_mpg Based on Class**  **The MEANS Procedure**   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | Analysis Variable : City\_mpg | | | | | | | | Class | **N Obs** | **Mean** | **Variance** | **Std Dev** | **Lower 95% CL for Mean** | **Upper 95% CL for Mean** | | Compact\_Car | **7981** | 16.4136073 | 26.7791582 | 5.1748583 | 16.3000582 | 16.5271564 | | Large\_Sport\_Ucars | **2139** | 15.6568490 | 13.9130623 | 3.7300218 | 15.4986878 | 15.8150102 | | Mid\_Size\_Car | **6578** | 17.5185467 | 39.3796925 | 6.2753241 | 17.3668705 | 17.6702228 | | Midsize\_Station\_Wagons | **908** | 16.2147577 | 19.5977092 | 4.4269300 | 15.9264291 | 16.5030863 | | Small\_Pickup\_Truck\_2WD | **3469** | 16.5269530 | 17.6553431 | 4.2018262 | 16.3870795 | 16.6668266 | | Small\_Station\_Wagons | **6769** | 16.9392820 | 42.9997111 | 6.5574165 | 16.7830406 | 17.0955235 | | Small\_sport\_Utility\_Cars | **5233** | 16.7729792 | 42.3956994 | 6.5111980 | 16.5965241 | 16.9494342 | | Standard\_Pickup\_Truck\_4WD | **7106** | 16.0963974 | 31.6575606 | 5.6265052 | 15.9655551 | 16.2272397 | | Standard\_Ucars\_4WD | **3109** | 16.3965905 | 29.8983281 | 5.4679364 | 16.2043122 | 16.5888689 | | Two\_Seaters | **5054** | 17.5182034 | 36.7618890 | 6.0631583 | 17.3510045 | 17.6854023 | | Van\_Cars | **781** | 16.0204866 | 29.7124003 | 5.4509082 | 15.6376037 | 16.4033694 |   **Descriptive Statistics For TOYOTA on High\_mpg Based on Class**  **The MEANS Procedure**   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | Analysis Variable : High\_mpg | | | | | | | | Class | **N Obs** | **Mean** | **Variance** | **Std Dev** | **Lower 95% CL for Mean** | **Upper 95% CL for Mean** | | Compact\_Car | **7981** | 22.3124922 | 38.4584768 | 6.2014899 | 22.1764162 | 22.4485681 | | Large\_Sport\_Ucars | **2139** | 21.3749416 | 27.6993905 | 5.2630210 | 21.1517778 | 21.5981054 | | Mid\_Size\_Car | **6578** | 22.9702037 | 43.9696153 | 6.6309589 | 22.8099318 | 23.1304756 | | Midsize\_Station\_Wagons | **908** | 21.8755507 | 33.4828415 | 5.7864360 | 21.4986766 | 22.2524247 | | Small\_Pickup\_Truck\_2WD | **3469** | 22.1640242 | 30.8401587 | 5.5533916 | 21.9791587 | 22.3488897 | | Small\_Station\_Wagons | **6769** | 23.0717979 | 50.6349152 | 7.1158215 | 22.9022515 | 23.2413443 | | Small\_sport\_Utility\_Cars | **5233** | 22.6287025 | 50.4410491 | 7.1021862 | 22.4362315 | 22.8211734 | | Standard\_Pickup\_Truck\_4WD | **7106** | 21.8335210 | 40.3831183 | 6.3547713 | 21.6857431 | 21.9812988 | | Standard\_Ucars\_4WD | **3109** | 22.3116758 | 40.3201371 | 6.3498139 | 22.0883865 | 22.5349651 | | Two\_Seaters | **5054** | 23.1228730 | 41.6969515 | 6.4573177 | 22.9448047 | 23.3009413 | | Van\_Cars | **781** | 21.4788732 | 37.8832069 | 6.1549335 | 21.0465383 | 21.9112082 |   **#R-CODE FOR KERNEL DENSITY ESTIMATION**  **> #The Kernel Density Estimation of Honda City Mpg**  > den\_H1 <- density(HONDA$City\_mpg, bw = 4, na.rm = TRUE)  > plot1=plot(den\_H1, main="Kernel Density of HONDA City\_mpg", ylab = "Density")    **#The Kernel Density Estimation of Honda Highway Mpg**  > den\_H2 <- density(HONDA$High\_mpg, bw = 4, na.rm = TRUE)  > plot1=plot(den\_H2, main="Kernel Density of HONDA Highway\_mpg", ylab = "Density")    #######################################################################  > **#The Kernel Density Estimation of Toyota City Mpg**  > den\_T1 <- density(TOYOTA$City\_mpg, bw = 4, na.rm = TRUE)  > plot1=plot(den\_T1, main="Kernel Density of TOYOTA City\_mpg", ylab = "Density")  >     |  | | --- | | #The Kernel Density Estimation of Toyota Highway Mpg  > den\_T2 <- density(TOYOTA$High\_mpg, bw = 4, na.rm = TRUE)  > plot1=plot(den\_T2, main="Kernel Density of TOYOTA Highway\_mpg", ylab = "Density") | |  | |  |     **##R OUTPUT FOR HONDA CITY\_MPG MEASURE OF FUEL ECONOMY**  **##THE REQUIRED DATA**  > dat=data.frame(Stratum,Nh,Sh, N\_hS\_h, n\_h, whj, Ybar\_h , t\_cup\_h, Vcup\_t\_h)  > dat  Stratum Nh Sh N\_hS\_h n\_h whj Ybar\_h t\_cup\_h Vcup\_t\_h  1 A 4961 8.4220 41781.542 1673 2.965332 18.39081 91236.816 691569.082  2 B 7022 8.9867 63104.607 2527 2.778789 18.44836 129544.368 1008755.156  3 C 80 3.7520 300.160 12 6.666667 16.33333 1306.667 6381.802  4 D 3070 7.0350 21597.450 865 3.549133 17.41040 53449.942 387310.317  5 E 7106 6.7320 47837.592 1916 3.708768 17.06889 121291.557 872338.963  6 F 1528 4.0490 6186.872 248 6.161290 15.57258 23794.903 129293.650  7 G 10988 7.4740 82124.312 3289 3.340833 17.68379 194309.534 1436796.575  8 H 11566 7.1730 82962.918 3323 3.480590 18.00211 208212.364 1476181.670  9 I 560 10.4430 5848.080 234 2.393162 18.94017 10606.496 85082.516  10 J 1385 6.7340 9326.590 374 3.703209 17.84492 24715.214 169775.708  11 K 1396 7.8070 10898.572 437 3.194508 17.43021 24332.568 186720.047  >  > N=sum(Nh)  > N  [1] 49662  > #THE ESTIMATED TOTAL FOR STRATIFIED REANDOM SAMPLING  > t\_cup\_str=sum(t\_cup\_h)  > t\_cup\_str  [1] 884195.4   |  | | --- | | > #ESTIMATED VARIANCE FOR THE ESTIMATED TOTALS FOR STRATIFIED SAMPLING  FOR CITY\_MPG  > sum(Vcup\_t\_h)  [1] 6450205.901 |   > ybar\_str=sum(t\_cup\_h)/N  > ybar\_str #As the estimated average fuel economy for HONDA Vehicles City\_MPG  [1] 17.77618  >  > #For the confidence interval of Ybar\_str,  > Varybar\_str=sum(Vcup\_t\_h)/(N^2)  > Varybar\_str # As the Varinace of Y bar str  [1] 0.002615322  >  > SE\_ybar\_str=sqrt(Varybar\_str) # As the Standard Error of Y bar str  > SE\_ybar\_str  [1] 0.05114022  >  > ##confidence interval for ybar\_str  > ybar\_str-1.96\*SE\_ybar\_str; ybar\_str+1.96\*SE\_ybar\_str  [1] 17.67594  [1] 17.87641  > **#(**17.67594**,** 17.87641**) as the confidence interval for ybar\_str** |
|  |
| |  | | --- | | > | |

**####R OUTPUT FOR HONDA HIGHWAY\_MPG MEASURE OF FUEL ECONOMY**

**##** THE REQUIRED DATA FOR HONDA Vehicles High\_MPG MEASURE OF FUEL ECONOMY

> dat=data.frame(Stratum,Nh,Sh, N\_hS\_h, n\_h, whj, Ybar\_h , t\_cup\_h, Vcup\_t\_h)

> dat

Stratum Nh Sh N\_hS\_h n\_h whj Ybar\_h t\_cup\_h Vcup\_t\_h

1 A 4961 8.238147 40869.4473 1592 3.116206 24.43279 121211.07 712502.264

2 B 7022 8.620113 60530.4356 2357 2.979211 24.62495 172916.38 1032711.085

3 C 80 5.260779 420.8623 16 5.000000 22.62500 1810.00 8856.253

4 D 3070 7.193217 22083.1759 860 3.569767 22.76977 69903.19 408205.178

5 E 7106 7.102620 50471.2142 1965 3.616285 22.73690 161568.38 937880.165

6 F 1528 5.608274 8569.4422 334 4.574850 21.88323 33437.58 171806.510

7 G 10988 7.752834 85188.1433 3318 3.311634 23.68626 260264.59 1526717.336

8 H 11566 7.617653 88105.7769 3431 3.371029 24.06208 278302.03 1591337.956

9 I 560 9.564615 5356.1842 209 2.679426 24.55024 13748.13 86036.713

10 J 1385 7.355872 10187.8823 397 3.488665 23.95466 33177.20 186502.433

11 K 1396 7.714624 10769.6147 419 3.331742 23.50119 32807.67 193729.364

>

> N=sum(Nh)

> N

[1] 49662

>

> #THE ESTIMATED TOTAL FOR STRATIFIED REANDOM SAMPLING

> t\_cup\_str=sum(t\_cup\_h)

> t\_cup\_str

[1] 1179392

|  |
| --- |
| > #ESTIMATED VARIANCE FOR THE ESTIMATED TOTALS FOR STRATIFIED SAMPLING FOR  HIGH\_MPG  > sum(Vcup\_t\_h)  [1] 6856284.542 |
|  |

> ybar\_str=sum(t\_cup\_h)/N

> ybar\_str #As the estimated average fuel economy for HONDA Vehicles High\_MPG

[1] 23.74343

>

> #For the confidence interval of Ybar\_str,

> Varybar\_str=sum(Vcup\_t\_h)/(N^2)

> Varybar\_str # As the Varinace of Y bar str

[1] 0.002779972

>

> SE\_ybar\_str=sqrt(Varybar\_str) # As the Standard Error of Y bar str

> SE\_ybar\_str

[1] 0.05272544

>

> ##confidence interval for ybar\_str

> ybar\_str-1.96\*SE\_ybar\_str; ybar\_str+1.96\*SE\_ybar\_str

[1] 23.64009

[1] 23.84677

> **#(**23.64009**,** 23.84677**) as the confidence interval for ybar\_str**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **##THE REQUIRED DATA FOR TOYOTA VEHICLE CITY\_MPG MEASURE OF FUEL ECONOMY**  > dat=data.frame(Stratum,Nh,Sh, N\_hS\_h, n\_h, whj, Ybar\_h , t\_cup\_h, Vcup\_t\_h)  > dat  Stratum Nh Sh N\_hS\_h n\_h whj Ybar\_h t\_cup\_h Vcup\_t\_h  1 A 7981 5.174858 41300.544 2178 3.664371 16.41965 131045.24 569441.26  2 B 2139 3.730022 7978.517 421 5.080760 15.54869 33258.66 121443.59  3 C 6578 6.275324 41279.082 2176 3.022978 17.55882 115501.94 524031.43  4 D 908 4.426930 4019.652 212 4.283019 16.10849 14626.51 58420.40  5 E 3469 4.201826 14576.135 769 4.511053 16.20286 56207.72 215039.33  6 F 6769 6.557417 44387.152 2341 2.891499 16.87142 114202.66 550549.35  7 G 5233 6.511198 34073.099 1797 2.912076 16.76071 87708.81 424206.79  8 H 7106 5.626505 39981.946 2108 3.370968 16.14658 114737.63 533369.65  9 I 3109 5.467936 16999.814 896 3.469866 16.14397 50191.61 229583.69  10 J 5054 6.063158 30643.202 1616 3.127475 17.52847 88588.86 395273.38  11 K 781 5.450908 4257.159 224 3.486607 15.40179 12028.79 57702.67  >  > N=sum(Nh)  > N  [1] 49127  >   |  | | --- | | > #THE ESTIMATED TOTAL FOR STRATIFIED REANDOM SAMPLING  > t\_cup\_str=sum(t\_cup\_h)  > t\_cup\_str  [1] 824090.6 | |  | | |  |  | | --- | --- | | |  | | --- | | > #ESTIMATED VARIANCE FOR THE ESTIMATED TOTALS FOR STRATIFIED SAMPLING FOR  HIGH\_MPG  > sum(Vcup\_t\_h)  [1] 3679062 | | |   > # THE ESTIMATED AVERAGE FUEL ECONOMY FOR TOYOTA VEHICLE CITY\_MPG IS  > ybar\_str=sum(t\_cup\_h)/N  > ybar\_str  [1] 16.65273  >  > # THE CONFINDENCE INTERVAL FOR ybar\_str  > Varybar\_str=sum(Vcup\_t\_h)/(N^2)  > Varybar\_str # As the Varinace of ybar\_st  [1] 0.001524392  >  > # the Standard Error of Ybar\_str  > SE\_ybar\_str=sqrt(Varybar\_str)  > SE\_ybar\_str  [1] 0.03904346  >  > ##confidence interval for ybar\_str  > ybar\_str-1.96\*SE\_ybar\_str; ybar\_str+1.96\*SE\_ybar\_str  [1] 16.5762  [1] 16.72925  >  > ##(16.576,16.730) as the confidence interval. |
|  |
| |  | | --- | |  | |

|  |  |
| --- | --- |
| **##THE REQUIRED DATA FOR TOYOTA VEHICLE HIGHWAY\_MPG MEASURE OF FUEL ECONOMY**  > dat=data.frame(Stratum,Nh,Sh, N\_hS\_h, n\_h, whj, Ybar\_h , t\_cup\_h, Vcup\_t\_h)  > dat  Stratum Nh Sh N\_hS\_h n\_h whj Ybar\_h t\_cup\_h Vcup\_t\_h  1 A 7981 6.201490 49494.091 2304 3.463976 22.10026 176382.18 756285.57  2 B 2139 5.263021 11257.602 524 4.082061 21.49809 45984.42 182609.02  3 C 6578 6.630959 43618.448 2031 3.238799 23.10241 151967.67 647532.50  4 D 908 5.786436 5254.084 245 3.706122 21.33061 19368.20 82272.67  5 E 3469 5.553392 19264.715 897 3.867336 22.06466 76542.31 306760.49  6 F 6769 7.115822 48166.996 2243 3.017833 22.96612 155457.64 691607.80  7 G 5233 7.102186 37165.740 1730 3.024855 22.59827 118256.73 534476.82  8 H 7106 6.354771 45157.005 2102 3.380590 21.67935 154053.48 683139.89  9 I 3109 6.349814 19741.571 919 3.383025 22.51687 70004.94 298724.83  10 J 5054 6.457318 32635.284 1519 3.327189 23.21461 117326.66 490423.41  11 K 781 6.154934 4807.003 224 3.486607 21.12500 16498.62 73570.71  >  > N=sum(Nh)  > N  [1] 49127  >   |  | | --- | | > #THE ESTIMATED TOTAL FOR STRATIFIED REANDOM SAMPLING  > t\_cup\_str=sum(t\_cup\_h)  > t\_cup\_str  [1] 1103188 |   > #ESTIMATED VARIANCE FOR THE ESTIMATED TOTALS FOR STRATIFIED SAMPLING FOR  HIGH\_MPG  > sum(Vcup\_t\_h)  [1] 4747404  > # THE ESTIMATED AVERAGE FUEL ECONOMY FOR TOYOTA VEHICLE HIGHWAY\_MPG IS  > ybar\_str=sum(t\_cup\_h)/N  > ybar\_str  [1] 22.42846  >  > # THE CONFINDENCE INTERVAL FOR ybar\_str  > Varybar\_str=sum(Vcup\_t\_h)/(N^2)  > Varybar\_str # As the Varinace of ybar\_str  [1] 0.001967051  >  > # the Standard Error of Ybar\_str  > SE\_ybar\_str=sqrt(Varybar\_str)  > SE\_ybar\_str  [1] 0.04435145  >  > ##confidence interval for ybar\_str  > ybar\_str-1.96\*SE\_ybar\_str; ybar\_str+1.96\*SE\_ybar\_str  [1] 22.34153  [1] 22.51539  > #(22.34153, 22.51539) as the confidence interval. |
|  |
| |  | | --- | | > | |

**library(readxl)**

**> HONDA <- read\_excel("F:/SPRING 2020/MAT 450 FINITE SAMPLING/PROJECT/MAT 450/HONDA.xlsx")**

> View(HONDA)

> **#USING SRS TO FIND THE FUEL ECONOMY OF HONDA AND TOYOTA VEHICLE MAKES**

> library(survey)

> library(SDaA)

**#HONDA VEHICLES**

**#######DRAW SAMPLES WITHOUT REPLACEMENT####**

> library(sampler)

> N=49662

> n=14898 # As the sample size to be drawn

> srs\_h=rsamp(df=HONDA, n=14898, rep=FALSE) ###replacement false

>

**#THE ESTIMATED AVERAGE FUEL ECONOMY FOR HONDA VEHICLES CITY\_MPG IS**

> ybar\_srs1=sum(srs\_h[, "City\_mpg"])/n

> ybar\_srs1

[1] 17.80595

> # As the estimated average fuel economy for HONDA Vehicles City\_MPG

>

Citysq\_diviation=(srs\_h$City\_mpg-ybar\_srs1)^2

**# the estimated variance of ybar\_srs1 for HONDA Vehicles City\_MPG is**

> varybar\_srs1=(1-n/N)\*(sum(Citysq\_diviation)/n)

> varybar\_srs1

[1] 38.69444

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| **#ESTIMATED VARIANCE FOR ESTIMATED TOTAL OF SRS**  > vart\_cup\_srs1=(N^2)\*varybar\_srs1  > vart\_cup\_srs1  [1] 95432648536 |
|  |

**# Confidence interval of ybar\_srs1 for HONDA City\_mpg is**

> ybar\_srs1-1.96\*sqrt(varybar\_srs1); ybar\_srs1+1.96\*sqrt(varybar\_srs1)

[1] 5.613796

[1] 29.9981

> #(5.613796,29.9981) As the confindence interval

**#THE ESTIMATED AVERAGE FUEL ECONOMY FOR HONDA VEHICLES HIGHWAY\_MPG IS**

> ybar\_srs2=sum(srs\_h[, "High\_mpg"])/n

> ybar\_srs2

[1] 23.86401

> # As the estimated average fuel economy for HONDA Vehicles Highway\_MPG

> Highsq\_diviation=(srs\_h$High\_mpg-ybar\_srs2)^2

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| >  > **# the estimated variance of ybar\_srs2 for HONDA Vehicles Highway\_MPG is**  > varybar\_srs2=(1-n/N)\*(sum(Highsq\_diviation)/n)  > varybar\_srs2  [1] 41.08336  >  **> #ESTIMATED VARIANCE FOR ESTIMATED TOTAL OF SRS**  > vart\_cup\_srs2=(N^2)\*varybar\_srs2  > vart\_cup\_srs2  [1] 101324475959  > **# Confidence interval of ybar\_srs2 forHONDA Highway\_mpg is**  > ybar\_srs2-1.96\*sqrt(varybar\_srs2); ybar\_srs2+1.96\*sqrt(varybar\_srs2)  [1] 11.25233  [1] 36.37809  > #(11.25233, 36.37809) As the confindence interval |
|  |
| |  |  |  |  | | --- | --- | --- | --- | | |  | | --- | | **View(TOYOTA)**  **> #TOYOTA VEHICLES**  **> #######DRAW SAMPLES WITHOUT REPLACEMENT####**  > library(sampler)  > N=49127  > n=14738 # As the sample size to be drawn  > srs\_h=rsamp(df=TOYOTA, n=14738, rep=FALSE) ###replacement false  >  > **#THE ESTIMATED AVERAGE FUEL ECONOMY FOR TOYOTA VEHICLES CITY\_MPG IS**  > ybar\_srs1=sum(srs\_h[, "City\_mpg"])/n  > ybar\_srs1  [1] 16.72649  > # As the estimated average fuel economy for TOYOTA Vehicles City\_MPG  > Citysq\_diviation=(srs\_h$City\_mpg-ybar\_srs1)^2  >  > **# the estimated variance of ybar\_srs1 for TOYOTA Vehicles City\_MPG is**  > varybar\_srs1=(1-n/N)\*(sum(Citysq\_diviation)/n)  > varybar\_srs1  [1] 22.03209  **> #ESTIMATED VARIANCE FOR ESTIMATED TOTAL OF SRS**  > vart\_cup\_srs1=(N^2)\*varybar\_srs1  > vart\_cup\_srs1  [1] 53173614838  **> # Confidence interval of ybar\_srs1 for TOYOTA City\_mpg is**  > ybar\_srs1-1.96\*sqrt(varybar\_srs1); ybar\_srs1+1.96\*sqrt(varybar\_srs1)  [1] 7.526573  [1] 25.92641  > #(7.526573,25.92641) As the confindence interval  >  > **#THE ESTIMATED AVERAGE FUEL ECONOMY FOR TOYOTA VEHICLES HIGHWAY\_MPG IS**  > ybar\_srs2=sum(srs\_h[, "High\_mpg"])/n  > ybar\_srs2  [1] 22.52673  > # As the estimated average fuel economy for TOYOTA Vehicles Highway\_MPG  >  > Highsq\_diviation=(srs\_h$High\_mpg-ybar\_srs2)^2  >  >  > **# the estimated variance of ybar\_srs2 for TOYOTA Vehicles Highway\_MPG is**  > varybar\_srs2=(1-n/N)\*(sum(Highsq\_diviation)/n)  > varybar\_srs2  [1] 28.64641  **#ESTIMATED VARIANCE FOR ESTIMATED TOTAL OF SRS**  > #Estimated variance for estimated total of SRS  > vart\_cup\_srs2=(N^2)\*varybar\_srs2  > vart\_cup\_srs2  [1] 69137025667  **> # Confidence interval of ybar\_srs for TOYOTA Highway\_mpg2 is**  > ybar\_srs2-1.96\*sqrt(varybar\_srs2); ybar\_srs2+1.96\*sqrt(varybar\_srs2)  [1] 12.03635  [1] 33.01711  > #(12.03635, 33.01711) As the confindence interval | |  | |  | | |

> dat1=data.frame(srs\_h, Citysq\_diviation, Highsq\_diviation)

**# REALATIVE GAIN FOR STRATIFICATION**

**> # The Relative Gain For Stratification For Honda City Mpg**

> sum(Vcup\_t\_h)/vart\_cup\_srs

[1] 6.758908e-05

**> # The Relative Gain For Stratification For Honda Highway Mpg**

>

> sum(Vcup\_t\_h)/vart\_cup\_srs2

[1] 6.766662e-05

>

> **# The Relative Gain For Stratification For Toyota City Mpg**

> sum(Vcup\_t\_h))/vart\_cup\_srs1

[1] 6.918962e-05

>

**> # The Relative Gain For Stratification For Toyota Highway Mpg**

> sum(Vcup\_t\_h)/vvart\_cup\_srs2

[1] 6.866659e-05