**R-Studio**

To get scatter plot:

Save all .txt or .csv files from GitHub

Run Capacity read.table (or import data, through environment window)

Install “scatterplot3d” if not already installed.

then run the scatterplot3d (make sure the code has the correct name for what data file has been saved as for capacities)

capacities.txt<- read.table("Capacities.txt", header = TRUE)

install.packages("scatterplot3d")

require("scatterplot3d")

scatterplot3d(capacities.txt)

s3d<- scatterplot3d(capacities.txt, pch=10, highlight.3d=TRUE, type="h", main="Capacities")

To run regression:

Have to specify column with c(1,2,3,4…..) to run regression. Can be copied directly from excel file. But will need to be formatted correctly (commas added between each number) Run first with information.

Then run regression

Capacity <- c(1900,1900,1890,1870,1865,1910,1900,1890,1880,1870,1900,1870,1860,1860,1850,1900,1840, 1830, 1810,1800,1910,1780,1770,1750,1710)

Grade <- rep(seq(0,8, 2), each=5)

HeavyVehicle <- rep(seq(0, 20, 5), 5)

Regression<- lm(Capacity ~ Grade + HeavyVehicle)

summary(Regression)

s3d<- scatterplot3d(RTestOne.txt,

pch=10,

highlight.3d=TRUE,

type="h",

main="Heavy Vehicle's Effect on Capacity")

capacities.txt<- read.table("Capacities.txt", header = TRUE)

install.packages("scatterplot3d")

require("scatterplot3d")

scatterplot3d(capacities.txt)

s3d<- scatterplot3d(capacities.txt,

pch=10,

highlight.3d=TRUE,

type="h",

main="Capacities")

#independent

Capacity <- c(1900,1900,1890,1870,1865,1910,1900,1890,1880,1870,1900,1870,1860,1860,1850,1900,1840, 1830, 1810,1800,1910,1780,1770,1750,1710)

#dependent

#Grade <- c(0,2,4,6,8,0,2,4,6,8,0,2,4,6,8,0,2,4,6,8,0,2,4,6,8)

#HeavyVehicle <- c(0,5,10,15,20,0,5,10,15,20,0,5,10,15,20,0,5,10,15,20,0,5,10,15,20)

Grade <- rep(seq(0,8, 2), each=5)

HeavyVehicle <- rep(seq(0, 20, 5), 5)

Regression<- lm(Capacity ~ Grade + HeavyVehicle)

summary(Regression)

new Regression for 900 values

Input:

Grade <- rep(rep(seq(0,8, by=2),each=180),1)

HV <- rep(rep(seq(0,20, by=5),each=36),5)

CAP <- c(1892, 1924, 1924, 1824, 1908, 1884, 1932, 1928, 1940, 1848, 1876, 1888, 1848, 1884, 1876, 1892, 1924, 1900, 1800, 1856, 1848, 1884, 1920, 1908, 1928, 1944, 1924, 1832, 1844, 1876, 1920, 1944, 1944, 1908, 1904, 1928,

1892, 1916, 1900, 1864, 1928, 1932, 1860, 1896, 1860, 1900, 1936, 1960, 1868, 1940, 1936, 1852, 1868, 1920, 1848, 1880, 1900, 1924, 1936, 1920, 1852, 1908, 1900, 1864, 1960, 1948, 1848, 1900, 1872, 1888, 1944, 1932,

1864, 1920, 1916, 1868, 1908, 1908, 1912, 1912, 1944, 1892, 1860, 1916, 1792, 1912, 1936, 1816, 1928, 1892, 1820, 1888, 1860, 1924, 1864, 1848, 1872, 1924, 1960, 1876, 1896, 1884, 1876, 1940, 1900, 1808, 1896, 1936,

1824, 1860, 1896, 1868, 1900, 1900, 1896, 1932, 1948, 1804, 1920, 1912, 1816, 1892, 1948, 1776, 1824, 1848, 1824, 1868, 1836, 1852, 1896, 1928, 1824, 1884, 1908, 1832, 1912, 1856, 1808, 1828, 1844, 1840, 1940, 1908,

1812, 1912, 1904, 1876, 1924, 1932, 1820, 1928, 1928, 1832, 1900, 1888, 1852, 1900, 1868, 1840, 1872, 1864, 1772, 1860, 1848, 1824, 1860, 1900, 1776, 1832, 1864, 1880, 1860, 1844, 1852, 1892, 1892, 1788, 1880, 1860,

1896, 1944, 1912, 1860, 1944, 1928, 1964, 1936, 1944, 1880, 1936, 1980, 1860, 1896, 1888, 1832, 1920, 1904, 1904, 1924, 1884, 1864, 1936, 1912, 1880, 1936, 1916, 1916, 1936, 1932, 1844, 1928, 1948, 1884, 1916, 1920,

1916, 1940, 1924, 1852, 1908, 1884, 1832, 1948, 1904, 1860, 1928, 1936, 1832, 1924, 1924, 1880, 1892, 1888, 1920, 1944, 1920, 1912, 1920, 1896, 1816, 1848, 1888, 1872, 1896, 1928, 1848, 1900, 1920, 1904, 1936, 1928,

1856, 1924, 1912, 1888, 1940, 1936, 1904, 1968, 1924, 1832, 1900, 1924, 1860, 1864, 1876, 1796, 1892, 1908, 1856, 1892, 1896, 1892, 1900, 1920, 1840, 1876, 1912, 1848, 1960, 1936, 1856, 1932, 1940, 1816, 1892, 1908,

1924, 1940, 1904, 1876, 1864, 1856, 1848, 1936, 1900, 1852, 1908, 1908, 1884, 1880, 1892, 1808, 1820, 1864, 1856, 1884, 1860, 1860, 1940, 1908, 1808, 1880, 1892, 1904, 1904, 1928, 1860, 1892, 1868, 1828, 1912, 1892,

1804, 1860, 1868, 1840, 1880, 1884, 1812, 1828, 1856, 1856, 1908, 1912, 1840, 1892, 1884, 1840, 1944, 1864, 1852, 1868, 1876, 1876, 1892, 1904, 1840, 1944, 1924, 1860, 1912, 1892, 1828, 1884, 1904, 1868, 1896, 1904,

1832, 1920, 1868, 1928, 1928, 1932, 1844, 1916, 1900, 1932, 1948, 1916, 1848, 1896, 1900, 1928, 1916, 1912, 1916, 1948, 1920, 1924, 1936, 1940, 1852, 1888, 1872, 1868, 1916, 1916, 1892, 1908, 1900, 1908, 1948, 1920,

1792, 1964, 1928, 1748, 1992, 1944, 1836, 1840, 1928, 1780, 1888, 1908, 1768, 1908, 1856, 1708, 1900, 1860, 1788, 1908, 1932, 1748, 1844, 1860, 1792, 1888, 1852, 1832, 1912, 1920, 1836, 1896, 1944, 1792, 1872, 1888,

1776, 1928, 1948, 1736, 1932, 1936, 1856, 1876, 1892, 1744, 1852, 1856, 1824, 1936, 1944, 1756, 1908, 1936, 1832, 1896, 1904, 1812, 1956, 1952, 1744, 1924, 1872, 1752, 1840, 1860, 1708, 1868, 1892, 1740, 1852, 1860,

1848, 1924, 1932, 1760, 1888, 1876, 1840, 1924, 1880, 1740, 1888, 1900, 1796, 1956, 1864, 1764, 1876, 1848, 1768, 1876, 1896, 1780, 1932, 1888, 1760, 1904, 1888, 1712, 1920, 1904, 1760, 1876, 1884, 1740, 1908, 1908,

1748, 1908, 1908, 1740, 1848, 1860, 1800, 1968, 1920, 1764, 1892, 1912, 1800, 1932, 1928, 1668, 1844, 1864, 1792, 1884, 1872, 1724, 1828, 1864, 1696, 1888, 1868, 1772, 1924, 1928, 1792, 1948, 1904, 1760, 1932, 1936,

1868, 1880, 1916, 1880, 1928, 1924, 1888, 1884, 1872, 1932, 1884, 1856, 1860, 1892, 1896, 1888, 1900, 1924, 1904, 1940, 1952, 1876, 1916, 1904, 1876, 1884, 1920, 1892, 1852, 1872, 1888, 1932, 1900, 1928, 1908, 1920,

1760, 1840, 1876, 1684, 1992, 1904, 1696, 1920, 1916, 1664, 1912, 1896, 1736, 1744, 1928, 1636, 1872, 1900, 1720, 1920, 1876, 1780, 1896, 1908, 1736, 1924, 1972, 1760, 1832, 1916, 1716, 2012, 1904, 1692, 1904, 1884,

1696, 1932, 1904, 1668, 1920, 1928, 1712, 1832, 1880, 1712, 1932, 1944, 1716, 1876, 1924, 1656, 1892, 1896, 1680, 1812, 1844, 1648, 1876, 1888, 1728, 1884, 1892, 1628, 1964, 1896, 1708, 1956, 1968, 1648, 1848, 1864,

1676, 1888, 1900, 1684, 1896, 1904, 1696, 1916, 1868, 1656, 1928, 1884, 1664, 1884, 1872, 1672, 1944, 1932, 1620, 1896, 1872, 1548, 1816, 1884, 1676, 1896, 1876, 1612, 1844, 1840, 1704, 1944, 1864, 1628, 1848, 1904,

1656, 1900, 1912, 1640, 1924, 1892, 1600, 1872, 1896, 1660, 1928, 1888, 1644, 1852, 1892, 1576, 1852, 1848, 1680, 1884, 1844, 1596, 1876, 1848, 1612, 1860, 1848, 1604, 1836, 1836, 1644, 1840, 1868, 1632, 1924, 1916,

1824, 1852, 1872, 1944, 1968, 1960, 1900, 1964, 1992, 1852, 1892, 1904, 1896, 1952, 1908, 1924, 1948, 1928, 1872, 1908, 1904, 1916, 1928, 1916, 1816, 1912, 1912, 1880, 1932, 1952, 1904, 1908, 1908, 1880, 1904, 1932,

1532, 1832, 1932, 1568, 1924, 1936, 1552, 1804, 1912, 1544, 1880, 1900, 1636, 1960, 1920, 1652, 1908, 1940, 1560, 1872, 1948, 1516, 1884, 1856, 1600, 1804, 1868, 1572, 1868, 1928, 1488, 1664, 1844, 1604, 1868, 1872,

1504, 1804, 1852, 1556, 1964, 1944, 1556, 1808, 1908, 1516, 1872, 1880, 1512, 1840, 1888, 1504, 1904, 1868, 1512, 1832, 1884, 1552, 1920, 1920, 1516, 1800, 1880, 1584, 1904, 1916, 1520, 1828, 1908, 1516, 1852, 1876,

1456, 1760, 1876, 1484, 1832, 1852, 1484, 1764, 1844, 1560, 1904, 1928, 1524, 1740, 1884, 1528, 1876, 1872, 1560, 1820, 1892, 1552, 1912, 1884, 1544, 1824, 1892, 1532, 1892, 1904, 1500, 1788, 1848, 1504, 1856, 1896,

1448, 1716, 1832, 1500, 1848, 1868, 1452, 1768, 1816, 1536, 1900, 1892, 1484, 1776, 1832, 1444, 1888, 1896, 1424, 1756, 1772, 1548, 1880, 1892, 1464, 1776, 1800, 1504, 1856, 1840, 1436, 1752, 1816, 1476, 1832, 1824)

Residuals:

Min 1Q Median 3Q Max

-335.05 -35.76 17.79 60.46 167.90

Coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) 1943.7556 6.9639 279.118 <2e-16 \*\*\*

Grade -13.3689 1.1011 -12.141 <2e-16 \*\*\*

HV -3.8876 0.4404 -8.827 <2e-16 \*\*\*

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Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 93.43 on 897 degrees of freedom

Multiple R-squared: 0.2008, Adjusted R-squared: 0.199

F-statistic: 112.7 on 2 and 897 DF, p-value: < 2.2e-16