Population Time Series Graph

[Title]

Chart, line chart

Description automatically generated

|  |  |
| --- | --- |
| Total population |  |
| Year |  |

Histogram

Chart, histogram

Description automatically generated

|  |  |
| --- | --- |
| Histogram of MPG1000 |  |
| Normal |  |
| Frequency |  |
| MPG1000 |  |
| Mean |  |
| StDev |  |
| N |  |

Standard Normal Distribution

Chart, histogram

Description automatically generated

|  |  |
| --- | --- |
| Probability density |  |
| z-score |  |

Standard Normal Distribution Probabilities

Chart

Description automatically generated

Example of Areas Under the Normal Curve

Chart

Description automatically generated

2 x 2 Crosstabulation

A picture containing calendar

Description automatically generatedText

Description automatically generated

|  |  |
| --- | --- |
| n |  |
| Where |  |
| n = number of units evaluated |  |

Homoscedasticity and Heteroscedasticity

Chart, radar chart, scatter chart

Description automatically generated

|  |  |
| --- | --- |
| Homoscedasticity |  |
| Heteroscedasticity |  |

Standard Bivariate Normal Distribution

Chart, surface chart

Description automatically generated

|  |  |
| --- | --- |
| Standard bivariate normal distribution, correlation = 0 |  |
| f(x, z) |  |
| z |  |
| x |  |

Correlation Coefficient Examples

Chart, scatter chart

Description automatically generated

|  |  |
| --- | --- |
| r |  |

Monotonic versus Non-Monotonic Relationships

Chart, scatter chart

Description automatically generated

|  |  |
| --- | --- |
| Monotonic |  |
| Non-monotonic |  |

Discrete Probability Distribution

Chart, histogram

Description automatically generated

|  |  |
| --- | --- |
| P(x) |  |
| x |  |

Continuous Probability Distribution

Histogram

Description automatically generated with low confidence

|  |  |
| --- | --- |
| Density |  |
| x |  |
| Reference |  |

Typical Normal Distribution

Chart

Description automatically generated

Student’s T-Distribution

Chart, histogram

Description automatically generated

|  |  |
| --- | --- |
| P(x) |  |
| x |  |
| v |  |

Z-Table

|  |  |
| --- | --- |
| *z*\**-*values for various confidence levels |  |
| **Confidence level** | **z\*-value** |
| 50% | 0 |
| 70% | .5 |
| 80% | 1.28 |
| 90% | 1.645 (by convention) |
| 95% | 1.96 |
| 98% | 2.33 |
| 99% | 2.58 |

|  |  |
| --- | --- |
| z\*-values for various confidence levels |  |
| Confidence level |  |
| z\*-value |  |
| by convention |  |

Sample Advertising Data

|  |  |
| --- | --- |
| Monthly sales | Monthly ad spending |
| 3,000,000 | 2,500 |
| 500,000 | 300 |
| 300,000 | 200 |
| 400,000 | 400 |
| 500,000 | 600 |
| 2,000,000 | 1,600 |
| 2,100,000 | 1,800 |
| 600,000 | 900 |
| 700,000 | 1,000 |

|  |  |
| --- | --- |
| Monthly sales |  |
| Monthly ad spending |  |

Scatterplot

Chart, scatter chart

Description automatically generated

|  |  |
| --- | --- |
| Monthly sales by ad spend |  |

Sample Regression Output—Summary

**Table

Description automatically generated**

|  |  |
| --- | --- |
| Regression Statistics |  |
| Multiple R |  |
| R Square |  |
| Adjusted R Square |  |
| Standard Error |  |
| Observations |  |
| ANOVA |  |
| Significance |  |
| Regression |  |
| Residual |  |
| Total |  |
| Coefficients |  |
| T Stat |  |
| P-value |  |
| Lower 95% |  |
| Upper 95% |  |
| Intercept |  |
| Monthly Ad Spend |  |
| RESIDUAL OUTPUT |  |
| Observation |  |
| Predicted Monthly Sales |  |

Sample Regression Output—Regression Statistics

|  |  |
| --- | --- |
| Summary output | |
| Regression statistics | |
| Multiple R | 0.941383306 |
| R square | 0.886202529 |
| Adjusted R square | 0.867236284 |
| Standard error | 265218.8942 |
| Observations | 8 |

|  |  |
| --- | --- |
| Summary output |  |
| Regression statistics |  |
| Multiple R |  |
| R square |  |
| Standard error |  |
| Observations |  |

Sample Regression Output—Regression Hypothesis Tests

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| ANOVA | | | | | | |
|  | df | SS | MS | F | Significance F | |
| Regression | 1 | 3.2867E+12 | 3.29E+12 | 46.72525 | 0.0004816 | |
| Residual | 6 | 4.22046E+11 | 7.03E+10 |  |  | |
| Total | 7 | 3.70875E+12 |  |  |  | |
|  | Coefficients | Standard error | t-stat | P-value | Lower 95% | Upper 95% |
| Intercept | -91028.22581 | 171129.0146 | -0.53193 | 0.613886 | -509765.84 | 327709.4 |
| Monthly ad spend | 1151.209677 | 168.4141662 | 6.83557 | 0.000482 | 739.11506 | 1563.304 |

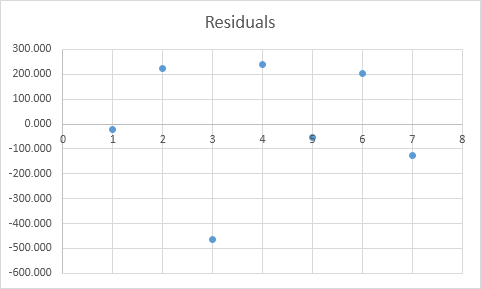
|  |  |
| --- | --- |
| ANOVA |  |
| Significance |  |
| Regression |  |
| Residual |  |
| Total |  |
| Coefficients |  |
| Standard error |  |
| t-stat |  |
| P-value |  |
| Lower 95% |  |
| Upper 95% |  |
| Intercept |  |
| Monthly ad spend |  |

Sample Regression Output—Residuals

|  |  |  |
| --- | --- | --- |
| Residual output | | |
| Observation | Predicted monthly sales | Residuals |
| 1 | 2878023 | 121977.5 |
| 2 | 345362.7 | 154637.3 |
| 3 | 230241.8 | 69758.2 |
| 4 | 460483.6 | -60483.6 |
| 5 | 690725.4 | -190725 |
| 6 | 1841934 | 158065.6 |
| 7 | 2072176 | 27823.8 |
| 8 | 1036088 | -436088 |
| 9 | 1151209 | -451209 |

|  |  |
| --- | --- |
| Residual output |  |
| Observation |  |
| Predicted monthly sales |  |
| Residuals |  |

Scatterplot of Residuals



|  |  |
| --- | --- |
| Residuals |  |

Scatter Plot with a Linear Trend Line



|  |  |
| --- | --- |
| Monthly sales by ad spend |  |