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| > library(faraway)  > hw4\_ans <- read.csv(file="C:/Users/buchh/OneDrive/Desktop/regression/hw4/HW04\_data.csv",header = TRUE)  > hw4\_ans  y x1 x2 x3 x4 x5 x6 x7 x8 x9  1 10 2113 1985 38.9 64.7 4 868 59.7 2205 1917  2 11 2003 2855 38.8 61.3 3 615 55.0 2096 1575  3 11 2957 1737 40.1 60.0 14 914 65.6 1847 2175  4 13 2285 2905 41.6 45.3 -4 957 61.4 1903 2476  5 10 2971 1666 39.2 53.8 15 836 66.1 1457 1866  6 11 2309 2927 39.7 74.1 8 786 61.0 1848 2339  7 10 2528 2341 38.1 65.4 12 754 66.1 1564 2092  8 11 2147 2737 37.0 78.3 -1 761 58.0 1821 1909  9 4 1689 1414 42.1 47.6 -3 714 57.0 2577 2001  10 2 2566 1838 42.3 54.2 -1 797 58.9 2476 2254  11 7 2363 1480 37.3 48.0 19 984 67.5 1984 2217  12 10 2109 2191 39.5 51.9 6 700 57.2 1917 1758  13 9 2295 2229 37.4 53.6 -5 1037 58.8 1761 2032  14 9 1932 2204 35.1 71.4 3 986 58.6 1709 2025  15 6 2213 2140 38.8 58.3 6 819 59.2 1901 1686  16 5 1722 1730 36.6 52.6 -19 791 54.4 2288 1835  17 5 1498 2072 35.3 59.3 -5 776 49.6 2072 1914  18 5 1873 2929 41.1 55.3 10 789 54.3 2861 2496  19 6 2118 2268 38.2 69.6 6 582 58.7 2411 2670  20 4 1775 1983 39.3 78.3 7 901 51.7 2289 2202  21 3 1904 1792 39.7 38.1 -9 734 61.9 2203 1988  22 3 1929 1606 39.7 68.8 -21 627 52.7 2592 2324  23 4 2080 1492 35.5 68.8 -8 722 57.8 2053 2550  24 10 2301 2835 35.3 74.1 2 683 59.7 1979 2110  25 6 2040 2416 38.7 50.0 0 576 54.9 2048 2628  26 8 2447 1638 39.9 57.1 -8 848 65.3 1786 1776  27 2 1416 2649 37.4 56.3 -22 684 43.8 2876 2524  28 0 1503 1503 39.3 47.0 -9 875 53.5 2560 2241  > require(olsrr)  Loading required package: olsrr  Registered S3 methods overwritten by 'car':  method from  influence.merMod lme4  cooks.distance.influence.merMod lme4  dfbeta.influence.merMod lme4  dfbetas.influence.merMod lme4  Attaching package: ‘olsrr’  The following object is masked from ‘package:faraway’:  hsb  The following object is masked from ‘package:datasets’:  rivers  > lmod <- lm(y ~ x1+x2+x3+x4+x5+x6+x7+x8+x9,data=hw4\_ans)  >  > # part (a)  > # best subset regregression  > k <- ols\_step\_best\_subset(lmod,print\_plot = TRUE)  > k  Best Subsets Regression  -----------------------------------------  Model Index Predictors  -----------------------------------------  1 x8  2 x2 x8  3 x2 x7 x8  4 x2 x7 x8 x9  5 x1 x2 x7 x8 x9  6 x2 x3 x4 x7 x8 x9  7 x2 x3 x4 x6 x7 x8 x9  8 x1 x2 x3 x4 x6 x7 x8 x9  9 x1 x2 x3 x4 x5 x6 x7 x8 x9  -----------------------------------------  Subsets Regression Summary  ---------------------------------------------------------------------------------------------------------------------------------  Adj. Pred  Model R-Square R-Square R-Square C(p) AIC SBIC SBC MSEP FPE HSP APC  ---------------------------------------------------------------------------------------------------------------------------------  1 0.5447 0.5272 0.4781 20.4444 132.2453 51.0309 136.2419 160.3564 6.1348 0.2290 0.5254  2 0.7433 0.7227 0.6916 3.0590 118.2011 39.4172 123.5299 94.1807 3.7173 0.1399 0.3183  3 0.7863 0.7596 0.7325 0.8591 115.0647 38.1084 121.7257 81.8043 3.3271 0.1266 0.2849  4 0.8012 0.7666 0.7319 1.4065 115.0435 39.6190 123.0368 79.5670 3.3310 0.1285 0.2853  5 0.8069 0.7630 0.6817 2.8498 116.2287 42.1219 125.5541 80.9650 3.4850 0.1367 0.2984  6 0.8118 0.7580 0.6906 4.3711 117.5084 44.8362 128.1660 82.8541 3.6629 0.1465 0.3137  7 0.8139 0.7488 0.6675 6.1650 119.1925 47.8085 131.1824 86.2366 3.9115 0.1601 0.3350  8 0.8156 0.7380 0.6061 8.0000 120.9370 50.8591 134.2590 90.2006 4.1933 0.1763 0.3591  9 0.8156 0.7234 0.5537 10.0000 122.9370 53.9702 137.5912 95.5065 4.5459 0.1970 0.3893  ---------------------------------------------------------------------------------------------------------------------------------  AIC: Akaike Information Criteria  SBIC: Sawa's Bayesian Information Criteria  SBC: Schwarz Bayesian Criteria  MSEP: Estimated error of prediction, assuming multivariate normality  FPE: Final Prediction Error  HSP: Hocking's Sp  APC: Amemiya Prediction Criteria  >  > # part (b)  > # forward stepwise regression  > k <- ols\_step\_forward\_p(lmod,details=TRUE)  Forward Selection Method  ---------------------------  Candidate Terms:  1. x1  2. x2  3. x3  4. x4  5. x5  6. x6  7. x7  8. x8  9. x9  We are selecting variables based on p value...  Forward Selection: Step 1  + x8  Model Summary  --------------------------------------------------------------  R 0.738 RMSE 2.393  R-Squared 0.545 Coef. Var 34.359  Adj. R-Squared 0.527 MSE 5.726  Pred R-Squared 0.478 MAE 1.971  --------------------------------------------------------------  RMSE: Root Mean Square Error  MSE: Mean Square Error  MAE: Mean Absolute Error  ANOVA  -------------------------------------------------------------------  Sum of  Squares DF Mean Square F Sig.  -------------------------------------------------------------------  Regression 178.092 1 178.092 31.103 0.0000  Residual 148.872 26 5.726  Total 326.964 27  -------------------------------------------------------------------  Parameter Estimates  ----------------------------------------------------------------------------------------  model Beta Std. Error Std. Beta t Sig lower upper  ----------------------------------------------------------------------------------------  (Intercept) 21.788 2.696 8.081 0.000 16.246 27.330  x8 -0.007 0.001 -0.738 -5.577 0.000 -0.010 -0.004  ----------------------------------------------------------------------------------------  Forward Selection: Step 2  + x2  Model Summary  --------------------------------------------------------------  R 0.862 RMSE 1.832  R-Squared 0.743 Coef. Var 26.311  Adj. R-Squared 0.723 MSE 3.358  Pred R-Squared 0.692 MAE 1.420  --------------------------------------------------------------  RMSE: Root Mean Square Error  MSE: Mean Square Error  MAE: Mean Absolute Error  ANOVA  -------------------------------------------------------------------  Sum of  Squares DF Mean Square F Sig.  -------------------------------------------------------------------  Regression 243.026 2 121.513 36.191 0.0000  Residual 83.938 25 3.358  Total 326.964 27  -------------------------------------------------------------------  Parameter Estimates  ----------------------------------------------------------------------------------------  model Beta Std. Error Std. Beta t Sig lower upper  ----------------------------------------------------------------------------------------  (Intercept) 14.713 2.618 5.621 0.000 9.322 20.104  x8 -0.007 0.001 -0.715 -7.049 0.000 -0.009 -0.005  x2 0.003 0.001 0.446 4.398 0.000 0.002 0.005  ----------------------------------------------------------------------------------------  Forward Selection: Step 3  + x7  Model Summary  --------------------------------------------------------------  R 0.887 RMSE 1.706  R-Squared 0.786 Coef. Var 24.500  Adj. R-Squared 0.760 MSE 2.911  Pred R-Squared 0.733 MAE 1.212  --------------------------------------------------------------  RMSE: Root Mean Square Error  MSE: Mean Square Error  MAE: Mean Absolute Error  ANOVA  -------------------------------------------------------------------  Sum of  Squares DF Mean Square F Sig.  -------------------------------------------------------------------  Regression 257.094 3 85.698 29.437 0.0000  Residual 69.870 24 2.911  Total 326.964 27  -------------------------------------------------------------------  Parameter Estimates  -----------------------------------------------------------------------------------------  model Beta Std. Error Std. Beta t Sig lower upper  -----------------------------------------------------------------------------------------  (Intercept) -1.808 7.901 -0.229 0.821 -18.115 14.498  x8 -0.005 0.001 -0.506 -3.771 0.001 -0.007 -0.002  x2 0.004 0.001 0.516 5.177 0.000 0.002 0.005  x7 0.194 0.088 0.300 2.198 0.038 0.012 0.376  -----------------------------------------------------------------------------------------  Forward Selection: Step 4  + x9  Model Summary  --------------------------------------------------------------  R 0.895 RMSE 1.681  R-Squared 0.801 Coef. Var 24.140  Adj. R-Squared 0.767 MSE 2.826  Pred R-Squared 0.732 MAE 1.107  --------------------------------------------------------------  RMSE: Root Mean Square Error  MSE: Mean Square Error  MAE: Mean Absolute Error  ANOVA  -------------------------------------------------------------------  Sum of  Squares DF Mean Square F Sig.  -------------------------------------------------------------------  Regression 261.960 4 65.490 23.172 0.0000  Residual 65.004 23 2.826  Total 326.964 27  -------------------------------------------------------------------  Parameter Estimates  -----------------------------------------------------------------------------------------  model Beta Std. Error Std. Beta t Sig lower upper  -----------------------------------------------------------------------------------------  (Intercept) -1.822 7.785 -0.234 0.817 -17.926 14.282  x8 -0.004 0.001 -0.422 -2.871 0.009 -0.007 -0.001  x2 0.004 0.001 0.548 5.416 0.000 0.002 0.005  x7 0.217 0.089 0.336 2.446 0.023 0.033 0.400  x9 -0.002 0.001 -0.139 -1.312 0.202 -0.004 0.001  -----------------------------------------------------------------------------------------  No more variables to be added.  Variables Entered:  + x8  + x2  + x7  + x9  Final Model Output  ------------------  Model Summary  --------------------------------------------------------------  R 0.895 RMSE 1.681  R-Squared 0.801 Coef. Var 24.140  Adj. R-Squared 0.767 MSE 2.826  Pred R-Squared 0.732 MAE 1.107  --------------------------------------------------------------  RMSE: Root Mean Square Error  MSE: Mean Square Error  MAE: Mean Absolute Error  ANOVA  -------------------------------------------------------------------  Sum of  Squares DF Mean Square F Sig.  -------------------------------------------------------------------  Regression 261.960 4 65.490 23.172 0.0000  Residual 65.004 23 2.826  Total 326.964 27  -------------------------------------------------------------------  Parameter Estimates  -----------------------------------------------------------------------------------------  model Beta Std. Error Std. Beta t Sig lower upper  -----------------------------------------------------------------------------------------  (Intercept) -1.822 7.785 -0.234 0.817 -17.926 14.282  x8 -0.004 0.001 -0.422 -2.871 0.009 -0.007 -0.001  x2 0.004 0.001 0.548 5.416 0.000 0.002 0.005  x7 0.217 0.089 0.336 2.446 0.023 0.033 0.400  x9 -0.002 0.001 -0.139 -1.312 0.202 -0.004 0.001  -----------------------------------------------------------------------------------------  > k  Selection Summary  -------------------------------------------------------------------------  Variable Adj.  Step Entered R-Square R-Square C(p) AIC RMSE  -------------------------------------------------------------------------  1 x8 0.5447 0.5272 20.4444 132.2453 2.3929  2 x2 0.7433 0.7227 3.0590 118.2011 1.8324  3 x7 0.7863 0.7596 0.8591 115.0647 1.7062  4 x9 0.8012 0.7666 1.4065 115.0435 1.6812  -------------------------------------------------------------------------  >  > # part (c)  > # backward stepwise regression  > k <- ols\_step\_backward\_p(lmod,details=TRUE)  Backward Elimination Method  ---------------------------  Candidate Terms:  1 . x1  2 . x2  3 . x3  4 . x4  5 . x5  6 . x6  7 . x7  8 . x8  9 . x9  We are eliminating variables based on p value...  x x5  Backward Elimination: Step 1  Variable x5 Removed  Model Summary  --------------------------------------------------------------  R 0.903 RMSE 1.781  R-Squared 0.816 Coef. Var 25.579  Adj. R-Squared 0.738 MSE 3.173  Pred R-Squared 0.606 MAE 1.117  --------------------------------------------------------------  RMSE: Root Mean Square Error  MSE: Mean Square Error  MAE: Mean Absolute Error  ANOVA  -------------------------------------------------------------------  Sum of  Squares DF Mean Square F Sig.  -------------------------------------------------------------------  Regression 266.671 8 33.334 10.504 0.0000  Residual 60.293 19 3.173  Total 326.964 27  -------------------------------------------------------------------  Parameter Estimates  -----------------------------------------------------------------------------------------  model Beta Std. Error Std. Beta t Sig lower upper  -----------------------------------------------------------------------------------------  (Intercept) -7.294 11.336 -0.643 0.528 -31.020 16.433  x1 0.001 0.002 0.090 0.417 0.681 -0.003 0.005  x2 0.004 0.001 0.521 4.594 0.000 0.002 0.005  x3 0.122 0.251 0.070 0.486 0.632 -0.404 0.648  x4 0.032 0.040 0.097 0.804 0.431 -0.051 0.115  x6 0.002 0.003 0.056 0.508 0.618 -0.005 0.008  x7 0.154 0.140 0.239 1.103 0.284 -0.139 0.447  x8 -0.004 0.002 -0.409 -1.952 0.066 -0.008 0.000  x9 -0.002 0.001 -0.153 -1.299 0.210 -0.005 0.001  -----------------------------------------------------------------------------------------  x x1  Backward Elimination: Step 2  Variable x1 Removed  Model Summary  --------------------------------------------------------------  R 0.902 RMSE 1.744  R-Squared 0.814 Coef. Var 25.045  Adj. R-Squared 0.749 MSE 3.042  Pred R-Squared 0.668 MAE 1.133  --------------------------------------------------------------  RMSE: Root Mean Square Error  MSE: Mean Square Error  MAE: Mean Absolute Error  ANOVA  -------------------------------------------------------------------  Sum of  Squares DF Mean Square F Sig.  -------------------------------------------------------------------  Regression 266.118 7 38.017 12.496 0.0000  Residual 60.846 20 3.042  Total 326.964 27  -------------------------------------------------------------------  Parameter Estimates  -----------------------------------------------------------------------------------------  model Beta Std. Error Std. Beta t Sig lower upper  -----------------------------------------------------------------------------------------  (Intercept) -9.130 10.230 -0.893 0.383 -30.468 12.209  x2 0.004 0.001 0.521 4.693 0.000 0.002 0.005  x3 0.167 0.222 0.095 0.751 0.461 -0.297 0.631  x4 0.037 0.037 0.113 1.001 0.329 -0.040 0.114  x6 0.001 0.003 0.051 0.476 0.639 -0.005 0.008  x7 0.189 0.110 0.293 1.716 0.102 -0.041 0.419  x8 -0.004 0.002 -0.443 -2.336 0.030 -0.008 0.000  x9 -0.002 0.001 -0.142 -1.263 0.221 -0.004 0.001  -----------------------------------------------------------------------------------------  x x6  Backward Elimination: Step 3  Variable x6 Removed  Model Summary  --------------------------------------------------------------  R 0.901 RMSE 1.712  R-Squared 0.812 Coef. Var 24.580  Adj. R-Squared 0.758 MSE 2.930  Pred R-Squared 0.691 MAE 1.124  --------------------------------------------------------------  RMSE: Root Mean Square Error  MSE: Mean Square Error  MAE: Mean Absolute Error  ANOVA  -------------------------------------------------------------------  Sum of  Squares DF Mean Square F Sig.  -------------------------------------------------------------------  Regression 265.428 6 44.238 15.097 0.0000  Residual 61.536 21 2.930  Total 326.964 27  -------------------------------------------------------------------  Parameter Estimates  -----------------------------------------------------------------------------------------  model Beta Std. Error Std. Beta t Sig lower upper  -----------------------------------------------------------------------------------------  (Intercept) -7.695 9.594 -0.802 0.432 -27.647 12.257  x2 0.004 0.001 0.513 4.762 0.000 0.002 0.005  x3 0.168 0.218 0.095 0.767 0.451 -0.287 0.622  x4 0.035 0.036 0.107 0.972 0.342 -0.040 0.110  x7 0.193 0.108 0.299 1.790 0.088 -0.031 0.417  x8 -0.004 0.002 -0.458 -2.500 0.021 -0.008 -0.001  x9 -0.002 0.001 -0.141 -1.284 0.213 -0.004 0.001  -----------------------------------------------------------------------------------------  x x3  Backward Elimination: Step 4  Variable x3 Removed  Model Summary  --------------------------------------------------------------  R 0.898 RMSE 1.696  R-Squared 0.807 Coef. Var 24.349  Adj. R-Squared 0.763 MSE 2.876  Pred R-Squared 0.703 MAE 1.128  --------------------------------------------------------------  RMSE: Root Mean Square Error  MSE: Mean Square Error  MAE: Mean Absolute Error  ANOVA  -------------------------------------------------------------------  Sum of  Squares DF Mean Square F Sig.  -------------------------------------------------------------------  Regression 263.703 5 52.741 18.341 0.0000  Residual 63.262 22 2.876  Total 326.964 27  -------------------------------------------------------------------  Parameter Estimates  -----------------------------------------------------------------------------------------  model Beta Std. Error Std. Beta t Sig lower upper  -----------------------------------------------------------------------------------------  (Intercept) -4.627 8.640 -0.536 0.598 -22.544 13.291  x2 0.004 0.001 0.533 5.127 0.000 0.002 0.005  x4 0.026 0.034 0.080 0.778 0.445 -0.044 0.097  x7 0.235 0.092 0.363 2.542 0.019 0.043 0.426  x8 -0.004 0.001 -0.385 -2.481 0.021 -0.007 -0.001  x9 -0.002 0.001 -0.151 -1.399 0.176 -0.004 0.001  -----------------------------------------------------------------------------------------  x x4  Backward Elimination: Step 5  Variable x4 Removed  Model Summary  --------------------------------------------------------------  R 0.895 RMSE 1.681  R-Squared 0.801 Coef. Var 24.140  Adj. R-Squared 0.767 MSE 2.826  Pred R-Squared 0.732 MAE 1.107  --------------------------------------------------------------  RMSE: Root Mean Square Error  MSE: Mean Square Error  MAE: Mean Absolute Error  ANOVA  -------------------------------------------------------------------  Sum of  Squares DF Mean Square F Sig.  -------------------------------------------------------------------  Regression 261.960 4 65.490 23.172 0.0000  Residual 65.004 23 2.826  Total 326.964 27  -------------------------------------------------------------------  Parameter Estimates  -----------------------------------------------------------------------------------------  model Beta Std. Error Std. Beta t Sig lower upper  -----------------------------------------------------------------------------------------  (Intercept) -1.822 7.785 -0.234 0.817 -17.926 14.282  x2 0.004 0.001 0.548 5.416 0.000 0.002 0.005  x7 0.217 0.089 0.336 2.446 0.023 0.033 0.400  x8 -0.004 0.001 -0.422 -2.871 0.009 -0.007 -0.001  x9 -0.002 0.001 -0.139 -1.312 0.202 -0.004 0.001  -----------------------------------------------------------------------------------------  No more variables satisfy the condition of p value = 0.3  Variables Removed:  x x5  x x1  x x6  x x3  x x4  Final Model Output  ------------------  Model Summary  --------------------------------------------------------------  R 0.895 RMSE 1.681  R-Squared 0.801 Coef. Var 24.140  Adj. R-Squared 0.767 MSE 2.826  Pred R-Squared 0.732 MAE 1.107  --------------------------------------------------------------  RMSE: Root Mean Square Error  MSE: Mean Square Error  MAE: Mean Absolute Error  ANOVA  -------------------------------------------------------------------  Sum of  Squares DF Mean Square F Sig.  -------------------------------------------------------------------  Regression 261.960 4 65.490 23.172 0.0000  Residual 65.004 23 2.826  Total 326.964 27  -------------------------------------------------------------------  Parameter Estimates  -----------------------------------------------------------------------------------------  model Beta Std. Error Std. Beta t Sig lower upper  -----------------------------------------------------------------------------------------  (Intercept) -1.822 7.785 -0.234 0.817 -17.926 14.282  x2 0.004 0.001 0.548 5.416 0.000 0.002 0.005  x7 0.217 0.089 0.336 2.446 0.023 0.033 0.400  x8 -0.004 0.001 -0.422 -2.871 0.009 -0.007 -0.001  x9 -0.002 0.001 -0.139 -1.312 0.202 -0.004 0.001  -----------------------------------------------------------------------------------------  > k  Elimination Summary  ------------------------------------------------------------------------  Variable Adj.  Step Removed R-Square R-Square C(p) AIC RMSE  ------------------------------------------------------------------------  1 x5 0.8156 0.738 8.0000 120.9370 1.7814  2 x1 0.8139 0.7488 6.1650 119.1925 1.7442  3 x6 0.8118 0.758 4.3711 117.5084 1.7118  4 x3 0.8065 0.7625 2.8862 116.2827 1.6957  5 x4 0.8012 0.7666 1.4065 115.0435 1.6812  ------------------------------------------------------------------------  >  > # part (d)  > # sequential (both directions) stepwise regression  > k <- ols\_step\_both\_p(lmod,details=TRUE)  Stepwise Selection Method  ---------------------------  Candidate Terms:  1. x1  2. x2  3. x3  4. x4  5. x5  6. x6  7. x7  8. x8  9. x9  We are selecting variables based on p value...  Stepwise Selection: Step 1  + x8  Model Summary  --------------------------------------------------------------  R 0.738 RMSE 2.393  R-Squared 0.545 Coef. Var 34.359  Adj. R-Squared 0.527 MSE 5.726  Pred R-Squared 0.478 MAE 1.971  --------------------------------------------------------------  RMSE: Root Mean Square Error  MSE: Mean Square Error  MAE: Mean Absolute Error  ANOVA  -------------------------------------------------------------------  Sum of  Squares DF Mean Square F Sig.  -------------------------------------------------------------------  Regression 178.092 1 178.092 31.103 0.0000  Residual 148.872 26 5.726  Total 326.964 27  -------------------------------------------------------------------  Parameter Estimates  ----------------------------------------------------------------------------------------  model Beta Std. Error Std. Beta t Sig lower upper  ----------------------------------------------------------------------------------------  (Intercept) 21.788 2.696 8.081 0.000 16.246 27.330  x8 -0.007 0.001 -0.738 -5.577 0.000 -0.010 -0.004  ----------------------------------------------------------------------------------------  Stepwise Selection: Step 2  + x2  Model Summary  --------------------------------------------------------------  R 0.862 RMSE 1.832  R-Squared 0.743 Coef. Var 26.311  Adj. R-Squared 0.723 MSE 3.358  Pred R-Squared 0.692 MAE 1.420  --------------------------------------------------------------  RMSE: Root Mean Square Error  MSE: Mean Square Error  MAE: Mean Absolute Error  ANOVA  -------------------------------------------------------------------  Sum of  Squares DF Mean Square F Sig.  -------------------------------------------------------------------  Regression 243.026 2 121.513 36.191 0.0000  Residual 83.938 25 3.358  Total 326.964 27  -------------------------------------------------------------------  Parameter Estimates  ----------------------------------------------------------------------------------------  model Beta Std. Error Std. Beta t Sig lower upper  ----------------------------------------------------------------------------------------  (Intercept) 14.713 2.618 5.621 0.000 9.322 20.104  x8 -0.007 0.001 -0.715 -7.049 0.000 -0.009 -0.005  x2 0.003 0.001 0.446 4.398 0.000 0.002 0.005  ----------------------------------------------------------------------------------------  Model Summary  --------------------------------------------------------------  R 0.862 RMSE 1.832  R-Squared 0.743 Coef. Var 26.311  Adj. R-Squared 0.723 MSE 3.358  Pred R-Squared 0.692 MAE 1.420  --------------------------------------------------------------  RMSE: Root Mean Square Error  MSE: Mean Square Error  MAE: Mean Absolute Error  ANOVA  -------------------------------------------------------------------  Sum of  Squares DF Mean Square F Sig.  -------------------------------------------------------------------  Regression 243.026 2 121.513 36.191 0.0000  Residual 83.938 25 3.358  Total 326.964 27  -------------------------------------------------------------------  Parameter Estimates  ----------------------------------------------------------------------------------------  model Beta Std. Error Std. Beta t Sig lower upper  ----------------------------------------------------------------------------------------  (Intercept) 14.713 2.618 5.621 0.000 9.322 20.104  x8 -0.007 0.001 -0.715 -7.049 0.000 -0.009 -0.005  x2 0.003 0.001 0.446 4.398 0.000 0.002 0.005  ----------------------------------------------------------------------------------------  Stepwise Selection: Step 3  + x7  Model Summary  --------------------------------------------------------------  R 0.887 RMSE 1.706  R-Squared 0.786 Coef. Var 24.500  Adj. R-Squared 0.760 MSE 2.911  Pred R-Squared 0.733 MAE 1.212  --------------------------------------------------------------  RMSE: Root Mean Square Error  MSE: Mean Square Error  MAE: Mean Absolute Error  ANOVA  -------------------------------------------------------------------  Sum of  Squares DF Mean Square F Sig.  -------------------------------------------------------------------  Regression 257.094 3 85.698 29.437 0.0000  Residual 69.870 24 2.911  Total 326.964 27  -------------------------------------------------------------------  Parameter Estimates  -----------------------------------------------------------------------------------------  model Beta Std. Error Std. Beta t Sig lower upper  -----------------------------------------------------------------------------------------  (Intercept) -1.808 7.901 -0.229 0.821 -18.115 14.498  x8 -0.005 0.001 -0.506 -3.771 0.001 -0.007 -0.002  x2 0.004 0.001 0.516 5.177 0.000 0.002 0.005  x7 0.194 0.088 0.300 2.198 0.038 0.012 0.376  -----------------------------------------------------------------------------------------  Model Summary  --------------------------------------------------------------  R 0.887 RMSE 1.706  R-Squared 0.786 Coef. Var 24.500  Adj. R-Squared 0.760 MSE 2.911  Pred R-Squared 0.733 MAE 1.212  --------------------------------------------------------------  RMSE: Root Mean Square Error  MSE: Mean Square Error  MAE: Mean Absolute Error  ANOVA  -------------------------------------------------------------------  Sum of  Squares DF Mean Square F Sig.  -------------------------------------------------------------------  Regression 257.094 3 85.698 29.437 0.0000  Residual 69.870 24 2.911  Total 326.964 27  -------------------------------------------------------------------  Parameter Estimates  -----------------------------------------------------------------------------------------  model Beta Std. Error Std. Beta t Sig lower upper  -----------------------------------------------------------------------------------------  (Intercept) -1.808 7.901 -0.229 0.821 -18.115 14.498  x8 -0.005 0.001 -0.506 -3.771 0.001 -0.007 -0.002  x2 0.004 0.001 0.516 5.177 0.000 0.002 0.005  x7 0.194 0.088 0.300 2.198 0.038 0.012 0.376  -----------------------------------------------------------------------------------------  No more variables to be added/removed.  Final Model Output  ------------------  Model Summary  --------------------------------------------------------------  R 0.887 RMSE 1.706  R-Squared 0.786 Coef. Var 24.500  Adj. R-Squared 0.760 MSE 2.911  Pred R-Squared 0.733 MAE 1.212  --------------------------------------------------------------  RMSE: Root Mean Square Error  MSE: Mean Square Error  MAE: Mean Absolute Error  ANOVA  -------------------------------------------------------------------  Sum of  Squares DF Mean Square F Sig.  -------------------------------------------------------------------  Regression 257.094 3 85.698 29.437 0.0000  Residual 69.870 24 2.911  Total 326.964 27  -------------------------------------------------------------------  Parameter Estimates  -----------------------------------------------------------------------------------------  model Beta Std. Error Std. Beta t Sig lower upper  -----------------------------------------------------------------------------------------  (Intercept) -1.808 7.901 -0.229 0.821 -18.115 14.498  x8 -0.005 0.001 -0.506 -3.771 0.001 -0.007 -0.002  x2 0.004 0.001 0.516 5.177 0.000 0.002 0.005  x7 0.194 0.088 0.300 2.198 0.038 0.012 0.376  -----------------------------------------------------------------------------------------  > k  Stepwise Selection Summary  -------------------------------------------------------------------------------------  Added/ Adj.  Step Variable Removed R-Square R-Square C(p) AIC RMSE  -------------------------------------------------------------------------------------  1 x8 addition 0.545 0.527 20.4440 132.2453 2.3929  2 x2 addition 0.743 0.723 3.0590 118.2011 1.8324  3 x7 addition 0.786 0.760 0.8590 115.0647 1.7062  ------------------------------------------------------------------------------------- |
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