

Project_MATH564

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Load the data

```
data <- read.csv("/Users/kevinmouofo/Downloads/Math-564-project-main/Data/Processed/clean_data.csv",
                 sep=",", header = TRUE)
str(data)

## 'data.frame': 1460 obs. of 82 variables:
## $ X           : int 1 2 3 4 5 6 7 8 9 10 ...
## $ Id          : int 1 2 3 4 5 6 7 8 9 10 ...
## $ MSSubClass   : int 60 20 60 70 60 50 20 60 50 190 ...
## $ MSZoning     : Factor w/ 5 levels "C (all)", "FV", ...: 4 4 4 4 4 4 4 4 4 5 4 ...
## $ LotFrontage   : int 65 80 68 60 84 85 75 75 51 50 ...
## $ LotArea       : int 8450 9600 11250 9550 14260 14115 10084 10382 6120 7420 ...
## $ Street        : Factor w/ 2 levels "Grvl", "Pave": 2 2 2 2 2 2 2 2 2 2 ...
## $ Alley          : Factor w/ 3 levels "Grvl", "None", ...: 2 2 2 2 2 2 2 2 2 2 ...
## $ LotShape       : Factor w/ 4 levels "IR1", "IR2", "IR3", ...: 4 4 1 1 1 1 4 1 4 4 ...
## $ LandContour    : Factor w/ 4 levels "Bnk", "HLS", "Low", ...: 4 4 4 4 4 4 4 4 4 4 ...
## $ Utilities      : Factor w/ 2 levels "AllPub", "NoSeWa": 1 1 1 1 1 1 1 1 1 1 ...
## $ LotConfig      : Factor w/ 5 levels "Corner", "CulDSac", ...: 5 3 5 1 3 5 5 1 5 1 ...
## $ LandSlope       : Factor w/ 3 levels "Gtl", "Mod", "Sev": 1 1 1 1 1 1 1 1 1 1 ...
## $ Neighborhood   : Factor w/ 25 levels "Elmngtn", "Blueste", ...: 6 25 6 7 14 12 21 17 18 4 ...
## $ Condition1     : Factor w/ 9 levels "Artery", "Feedr", ...: 3 2 3 3 3 3 3 5 1 1 ...
## $ Condition2     : Factor w/ 8 levels "Artery", "Feedr", ...: 3 3 3 3 3 3 3 3 1 ...
## $ BldgType       : Factor w/ 5 levels "1Fam", "2fmCon", ...: 1 1 1 1 1 1 1 1 2 ...
## $ HouseStyle     : Factor w/ 8 levels "1.5Fin", "1.5Unf", ...: 6 3 6 6 6 1 3 6 1 2 ...
## $ OverallQual    : int 7 6 7 7 8 5 8 7 7 5 ...
## $ OverallCond    : int 5 8 5 5 5 5 5 6 5 6 ...
## $ YearBuilt      : int 2003 1976 2001 1915 2000 1993 2004 1973 1931 1939 ...
## $ YearRemodAdd   : int 2003 1976 2002 1970 2000 1995 2005 1973 1950 1950 ...
## $ RoofStyle       : Factor w/ 6 levels "Flat", "Gable", ...: 2 2 2 2 2 2 2 2 2 ...
## $ RoofMatl       : Factor w/ 8 levels "ClyTile", "CompShg", ...: 2 2 2 2 2 2 2 2 2 ...
## $ Exterior1st     : Factor w/ 15 levels "AsbShng", "AsphShn", ...: 13 9 13 14 13 13 13 7 4 9 ...
## $ Exterior2nd     : Factor w/ 16 levels "AsbShng", "AsphShn", ...: 14 9 14 16 14 14 14 7 16 9 ...
## $ MasVnrType     : Factor w/ 4 levels "BrkCmn", "BrkFace", ...: 2 3 2 3 2 3 4 4 3 3 ...
## $ MasVnrArea     : int 196 0 162 0 350 0 186 240 0 0 ...
## $ ExterQual      : Factor w/ 4 levels "Ex", "Fa", "Gd", ...: 3 4 3 4 3 4 3 4 4 4 ...
## $ ExterCond      : Factor w/ 5 levels "Ex", "Fa", "Gd", ...: 5 5 5 5 5 5 5 5 5 5 ...
## $ Foundation     : Factor w/ 6 levels "BrkTil", "CBlock", ...: 3 2 3 1 3 6 3 2 1 1 ...
## $ BsmtQual       : Factor w/ 5 levels "Ex", "Fa", "Gd", ...: 3 3 3 5 3 3 1 3 5 5 ...
## $ BsmtCond       : Factor w/ 5 levels "Fa", "Gd", "None", ...: 5 5 5 2 5 5 5 5 5 5 ...
## $ BsmtExposure   : Factor w/ 5 levels "Av", "Gd", "Mn", ...: 4 2 3 4 1 4 1 3 4 4 ...
## $ BsmtFinType1   : Factor w/ 7 levels "ALQ", "BLQ", "GLQ", ...: 3 1 3 1 3 3 3 1 7 3 ...
```

```

## $ BsmtFinSF1 : int 706 978 486 216 655 732 1369 859 0 851 ...
## $ BsmtFinType2 : Factor w/ 7 levels "ALQ","BLQ","GLQ",...: 7 7 7 7 7 7 7 2 7 7 ...
## $ BsmtFinSF2 : int 0 0 0 0 0 0 32 0 0 ...
## $ BsmtUnfSF : int 150 284 434 540 490 64 317 216 952 140 ...
## $ TotalBsmtSF : int 856 1262 920 756 1145 796 1686 1107 952 991 ...
## $ Heating : Factor w/ 6 levels "Floor","GasA",...: 2 2 2 2 2 2 2 2 2 ...
## $ HeatingQC : Factor w/ 5 levels "Ex","Fa","Gd",...: 1 1 1 3 1 1 1 1 3 1 ...
## $ CentralAir : Factor w/ 2 levels "N","Y": 2 2 2 2 2 2 2 2 2 ...
## $ Electrical : Factor w/ 5 levels "FuseA","FuseF",...: 5 5 5 5 5 5 5 5 5 2 5 ...
## $ X1stFlrSF : int 856 1262 920 961 1145 796 1694 1107 1022 1077 ...
## $ X2ndFlrSF : int 854 0 866 756 1053 566 0 983 752 0 ...
## $ LowQualFinSF : int 0 0 0 0 0 0 0 0 0 ...
## $ GrLivArea : int 1710 1262 1786 1717 2198 1362 1694 2090 1774 1077 ...
## $ BsmtFullBath : int 1 0 1 1 1 1 1 1 0 1 ...
## $ BsmtHalfBath : int 0 1 0 0 0 0 0 0 0 ...
## $ FullBath : int 2 2 2 1 2 1 2 2 2 1 ...
## $ HalfBath : int 1 0 1 0 1 1 0 1 0 0 ...
## $ BedroomAbvGr : int 3 3 3 3 4 1 3 3 2 2 ...
## $ KitchenAbvGr : int 1 1 1 1 1 1 1 1 2 2 ...
## $ KitchenQual : Factor w/ 4 levels "Ex","Fa","Gd",...: 3 4 3 3 3 4 3 4 4 4 ...
## $ TotRmsAbvGrd : int 8 6 6 7 9 5 7 7 8 5 ...
## $ Functional : Factor w/ 7 levels "Maj1","Maj2",...: 7 7 7 7 7 7 7 3 7 ...
## $ Fireplaces : int 0 1 1 1 1 0 1 2 2 2 ...
## $ FireplaceQu : Factor w/ 6 levels "Ex","Fa","Gd",...: 4 6 6 3 6 4 3 6 6 6 ...
## $ GarageType : Factor w/ 7 levels "2Types","Attchd",...: 2 2 2 6 2 2 2 2 6 2 ...
## $ GarageYrBlt : int 2003 1976 2001 1998 2000 1993 2004 1973 1931 1939 ...
## $ GarageFinish : Factor w/ 4 levels "Fin","None","RFn",...: 3 3 3 4 3 4 3 3 4 3 ...
## $ GarageCars : int 2 2 2 3 3 2 2 2 2 1 ...
## $ GarageArea : int 548 460 608 642 836 480 636 484 468 205 ...
## $ GarageQual : Factor w/ 6 levels "Ex","Fa","Gd",...: 6 6 6 6 6 6 6 6 2 3 ...
## $ GarageCond : Factor w/ 6 levels "Ex","Fa","Gd",...: 6 6 6 6 6 6 6 6 6 6 ...
## $ PavedDrive : Factor w/ 3 levels "N","P","Y": 3 3 3 3 3 3 3 3 3 3 ...
## $ WoodDeckSF : int 0 298 0 0 192 40 255 235 90 0 ...
## $ OpenPorchSF : int 61 0 42 35 84 30 57 204 0 4 ...
## $ EnclosedPorch: int 0 0 0 272 0 0 0 228 205 0 ...
## $ X3SsnPorch : int 0 0 0 0 0 320 0 0 0 0 ...
## $ ScreenPorch : int 0 0 0 0 0 0 0 0 0 0 ...
## $ PoolArea : int 0 0 0 0 0 0 0 0 0 0 ...
## $ PoolQC : Factor w/ 4 levels "Ex","Fa","Gd",...: 4 4 4 4 4 4 4 4 4 4 ...
## $ Fence : Factor w/ 5 levels "GdPrv","GdWo",...: 5 5 5 5 5 3 5 5 5 5 ...
## $ MiscFeature : Factor w/ 5 levels "Gar2","None",...: 2 2 2 2 2 4 2 4 2 2 ...
## $ MiscVal : int 0 0 0 0 0 700 0 350 0 0 ...
## $ MoSold : int 2 5 9 2 12 10 8 11 4 1 ...
## $ YrSold : int 2008 2007 2008 2006 2008 2009 2007 2009 2008 2008 ...
## $ SaleType : Factor w/ 9 levels "COD","Con","ConLD",...: 9 9 9 9 9 9 9 9 9 ...
## $ SaleCondition: Factor w/ 6 levels "Abnorml","AdjLand",...: 5 5 5 1 5 5 5 5 1 5 ...
## $ SalePrice : int 208500 181500 223500 140000 250000 143000 307000 200000 129900 118000 ...

```

Bidirectional elimination

```

fit0 <- lm(SalePrice~., data=data[-c(1,2)])
fit.both <- step(fit0, scope=list(lower=~MSZoning + Street + Alley + LotShape + LandContour + 

```

```

## Start: AIC=29493.25
## SalePrice ~ MSSubClass + MSZoning + LotFrontage + LotArea + Street +
## Alley + LotShape + LandContour + Utilities + LotConfig +
## LandSlope + Neighborhood + Condition1 + Condition2 + BldgType +
## HouseStyle + OverallQual + OverallCond + YearBuilt + YearRemodAdd +
## RoofStyle + RoofMatl + Exterior1st + Exterior2nd + MasVnrType +
## MasVnrArea + ExterQual + ExterCond + Foundation + BsmtQual +
## BsmtCond + BsmtExposure + BsmtFinType1 + BsmtFinSF1 + BsmtFinType2 +
## BsmtFinSF2 + BsmtUnfSF + TotalBsmtSF + Heating + HeatingQC +
## CentralAir + Electrical + X1stFlrSF + X2ndFlrSF + LowQualFinSF +
## GrLivArea + BsmtFullBath + BsmtHalfBath + FullBath + HalfBath +
## BedroomAbvGr + KitchenAbvGr + KitchenQual + TotRmsAbvGrd +
## Functional + Fireplaces + FireplaceQu + GarageType + GarageYrBlt +
## GarageFinish + GarageCars + GarageArea + GarageQual + GarageCond +
## PavedDrive + WoodDeckSF + OpenPorchSF + EnclosedPorch + X3SsnPorch +
## ScreenPorch + PoolArea + PoolQC + Fence + MiscFeature + MiscVal +
## MoSold + YrSold + SaleType + SaleCondition
##
##
## Step: AIC=29493.25
## SalePrice ~ MSSubClass + MSZoning + LotFrontage + LotArea + Street +
## Alley + LotShape + LandContour + Utilities + LotConfig +
## LandSlope + Neighborhood + Condition1 + Condition2 + BldgType +
## HouseStyle + OverallQual + OverallCond + YearBuilt + YearRemodAdd +
## RoofStyle + RoofMatl + Exterior1st + Exterior2nd + MasVnrType +
## MasVnrArea + ExterQual + ExterCond + Foundation + BsmtQual +
## BsmtCond + BsmtExposure + BsmtFinType1 + BsmtFinSF1 + BsmtFinType2 +
## BsmtFinSF2 + BsmtUnfSF + TotalBsmtSF + Heating + HeatingQC +
## CentralAir + Electrical + X1stFlrSF + X2ndFlrSF + LowQualFinSF +
## BsmtFullBath + BsmtHalfBath + FullBath + HalfBath + BedroomAbvGr +
## KitchenAbvGr + KitchenQual + TotRmsAbvGrd + Functional +
## Fireplaces + FireplaceQu + GarageType + GarageYrBlt + GarageFinish +
## GarageCars + GarageArea + GarageQual + GarageCond + PavedDrive +
## WoodDeckSF + OpenPorchSF + EnclosedPorch + X3SsnPorch + ScreenPorch +
## PoolArea + PoolQC + Fence + MiscFeature + MiscVal + MoSold +
## YrSold + SaleType + SaleCondition
##
##
## Step: AIC=29493.25
## SalePrice ~ MSSubClass + MSZoning + LotFrontage + LotArea + Street +
## Alley + LotShape + LandContour + Utilities + LotConfig +
## LandSlope + Neighborhood + Condition1 + Condition2 + BldgType +
## HouseStyle + OverallQual + OverallCond + YearBuilt + YearRemodAdd +
## RoofStyle + RoofMatl + Exterior1st + Exterior2nd + MasVnrType +
## MasVnrArea + ExterQual + ExterCond + Foundation + BsmtQual +
## BsmtCond + BsmtExposure + BsmtFinType1 + BsmtFinSF1 + BsmtFinType2 +
## BsmtFinSF2 + BsmtUnfSF + Heating + HeatingQC + CentralAir +
## Electrical + X1stFlrSF + X2ndFlrSF + LowQualFinSF + BsmtFullBath +
## BsmtHalfBath + FullBath + HalfBath + BedroomAbvGr + KitchenAbvGr +
## KitchenQual + TotRmsAbvGrd + Functional + Fireplaces + FireplaceQu +
## GarageType + GarageYrBlt + GarageFinish + GarageCars + GarageArea +
## GarageQual + GarageCond + PavedDrive + WoodDeckSF + OpenPorchSF +
## EnclosedPorch + X3SsnPorch + ScreenPorch + PoolArea + PoolQC +
## Fence + MiscFeature + MiscVal + MoSold + YrSold + SaleType +

```

```

##      SaleCondition
##
##              Df  Sum of Sq      RSS     AIC
## - Exterior2nd 14 4.4552e+09 6.1927e+11 29476
## - Heating      5 1.4297e+09 6.1624e+11 29487
## - Electrical   4 7.1399e+08 6.1553e+11 29487
## - MiscFeature  4 7.7067e+08 6.1558e+11 29487
## - ExterCond    4 1.0146e+09 6.1583e+11 29488
## - SaleType     8 4.5234e+09 6.1934e+11 29488
## - HouseStyle   7 4.0030e+09 6.1882e+11 29489
## - Alley        2 5.7008e+07 6.1487e+11 29489
## - PavedDrive   2 2.3593e+08 6.1505e+11 29490
## - GarageType   5 3.0804e+09 6.1789e+11 29490
## - LotShape     3 1.4160e+09 6.1623e+11 29491
## - Exterior1st  13 9.9583e+09 6.2477e+11 29491
## - BsmtFinType2 5 3.2277e+09 6.1804e+11 29491
## - FireplaceQu  5 3.2993e+09 6.1811e+11 29491
## - HeatingQC    4 2.4978e+09 6.1731e+11 29491
## - MiscVal      1 1.7832e+05 6.1481e+11 29491
## - CentralAir   1 8.0950e+05 6.1481e+11 29491
## - OpenPorchSF  1 1.4647e+06 6.1481e+11 29491
## - BsmtHalfBath 1 1.3015e+07 6.1483e+11 29491
## - LowQualFinSF 1 2.7865e+07 6.1484e+11 29491
## - EnclosedPorch 1 2.8985e+07 6.1484e+11 29491
## - GarageFinish  2 9.0075e+08 6.1571e+11 29491
## - SaleCondition 5 3.5386e+09 6.1835e+11 29492
## - GarageYrBlt  1 2.0770e+08 6.1502e+11 29492
## - MSSubClass    1 2.2368e+08 6.1504e+11 29492
## - BsmtFullBath  1 3.2100e+08 6.1513e+11 29492
## - HalfBath     1 3.9976e+08 6.1521e+11 29492
## - YrSold       1 6.3449e+08 6.1545e+11 29493
## - LotFrontage   1 6.3588e+08 6.1545e+11 29493
## - Foundation   5 4.0707e+09 6.1888e+11 29493
## <none>           6.1481e+11 29493
## - BsmtFinType1  5 4.2493e+09 6.1906e+11 29493
## - MasVnrType   3 2.6126e+09 6.1742e+11 29493
## - Fence        4 3.4805e+09 6.1829e+11 29494
## - BldgType     4 3.5027e+09 6.1831e+11 29494
## - Utilities    1 1.0158e+09 6.1583e+11 29494
## - X3SsnPorch   1 1.1317e+09 6.1594e+11 29494
## - BsmtCond     3 2.8848e+09 6.1770e+11 29494
## - MSZoning     4 3.8396e+09 6.1865e+11 29494
## - FullBath     1 1.4410e+09 6.1625e+11 29495
## - GarageCars   1 1.4712e+09 6.1628e+11 29495
## - RoofStyle    5 4.9885e+09 6.1980e+11 29495
## - TotRmsAbvGrd 1 1.7883e+09 6.1660e+11 29496
## - MoSold       1 1.9165e+09 6.1673e+11 29496
## - YearRemodAdd 1 1.9433e+09 6.1676e+11 29496
## - GarageArea   1 2.8501e+09 6.1766e+11 29498
## - KitchenAbvGr 1 2.9464e+09 6.1776e+11 29498
## - Fireplaces   1 2.9819e+09 6.1779e+11 29498
## - GarageCond   4 5.7312e+09 6.2054e+11 29499
## - WoodDeckSF   1 3.5272e+09 6.1834e+11 29500
## - BedroomAbvGr 1 3.7204e+09 6.1853e+11 29500

```

```

## - Street      1 3.8927e+09 6.1870e+11 29500
## - LandContour 3 5.8678e+09 6.2068e+11 29501
## - ScreenPorch 1 4.3854e+09 6.1920e+11 29502
## - PoolArea    1 4.6668e+09 6.1948e+11 29502
## - BsmtFinSF2   1 5.8291e+09 6.2064e+11 29505
## - LotConfig    4 8.5838e+09 6.2340e+11 29506
## - PoolQC       3 8.2169e+09 6.2303e+11 29507
## - MasVnrArea   1 6.6564e+09 6.2147e+11 29507
## - GarageQual   4 9.2820e+09 6.2409e+11 29507
## - LandSlope     2 9.6202e+09 6.2443e+11 29512
## - YearBuilt    1 8.8225e+09 6.2363e+11 29512
## - BsmtUnfSF    1 8.9259e+09 6.2374e+11 29512
## - ExterQual    3 1.0774e+10 6.2559e+11 29513
## - Functional   6 1.3876e+10 6.2869e+11 29514
## - Condition1   8 2.0069e+10 6.3488e+11 29524
## - BsmtQual     3 1.5998e+10 6.3081e+11 29525
## - LotArea       1 2.0082e+10 6.3489e+11 29538
## - BsmtExposure 3 2.2255e+10 6.3707e+11 29539
## - KitchenQual   3 2.3776e+10 6.3859e+11 29543
## - OverallCond   1 2.2078e+10 6.3689e+11 29543
## - OverallQual   1 2.2946e+10 6.3776e+11 29545
## - BsmtFinSF1    1 2.6793e+10 6.4161e+11 29554
## - X1stFlrSF     1 3.4153e+10 6.4897e+11 29570
## - X2ndFlrSF     1 6.1345e+10 6.7616e+11 29630
## - Condition2    7 7.8534e+10 6.9335e+11 29655
## - RoofMatl      7 8.1335e+10 6.9615e+11 29661
## - Neighborhood  24 1.0615e+11 7.2096e+11 29678
##
## Step: AIC=29475.79
## SalePrice ~ MSSubClass + MSZoning + LotFrontage + LotArea + Street +
## Alley + LotShape + LandContour + Utilities + LotConfig +
## LandSlope + Neighborhood + Condition1 + Condition2 + BldgType +
## HouseStyle + OverallQual + OverallCond + YearBuilt + YearRemodAdd +
## RoofStyle + RoofMatl + Exterior1st + MasVnrType + MasVnrArea +
## ExterQual + ExterCond + Foundation + BsmtQual + BsmtCond +
## BsmtExposure + BsmtFinType1 + BsmtFinSF1 + BsmtFinType2 +
## BsmtFinSF2 + BsmtUnfSF + Heating + HeatingQC + CentralAir +
## Electrical + X1stFlrSF + X2ndFlrSF + LowQualFinSF + BsmtFullBath +
## BsmtHalfBath + FullBath + HalfBath + BedroomAbvGr + KitchenAbvGr +
## KitchenQual + TotRmsAbvGrd + Functional + Fireplaces + FireplaceQu +
## GarageType + GarageYrBlt + GarageFinish + GarageCars + GarageArea +
## GarageQual + GarageCond + PavedDrive + WoodDeckSF + OpenPorchSF +
## EnclosedPorch + X3SsnPorch + ScreenPorch + PoolArea + PoolQC +
## Fence + MiscFeature + MiscVal + MoSold + YrSold + SaleType +
## SaleCondition
##
##          Df  Sum of Sq      RSS      AIC
## - Heating      5 1.1370e+09 6.2040e+11 29468
## - MiscFeature  4 7.3956e+08 6.2001e+11 29470
## - ExterCond    4 8.4343e+08 6.2011e+11 29470
## - Electrical   4 9.0534e+08 6.2017e+11 29470
## - SaleType     8 4.4502e+09 6.2372e+11 29470
## - Alley         2 6.5878e+07 6.1933e+11 29472
## - HouseStyle   7 4.4937e+09 6.2376e+11 29472

```

```

## - PavedDrive      2 2.4980e+08 6.1952e+11 29472
## - BsmtFinType2   5 2.8982e+09 6.2217e+11 29473
## - GarageType      5 2.9096e+09 6.2218e+11 29473
## - LotShape        3 1.5246e+09 6.2079e+11 29473
## - CentralAir      1 3.8723e+05 6.1927e+11 29474
## - MiscVal         1 3.0826e+06 6.1927e+11 29474
## - OpenPorchSF     1 6.6816e+06 6.1927e+11 29474
## - HeatingQC       4 2.5621e+09 6.2183e+11 29474
## - BsmtHalfBath    1 1.2569e+07 6.1928e+11 29474
## - LowQualFinSF    1 1.6273e+07 6.1928e+11 29474
## - FireplaceQu     5 3.4237e+09 6.2269e+11 29474
## - EnclosedPorch   1 2.2013e+07 6.1929e+11 29474
## - GarageFinish     2 8.7693e+08 6.2014e+11 29474
## - GarageYrBlt     1 1.9100e+08 6.1946e+11 29474
## - MSSubClass       1 2.3778e+08 6.1951e+11 29474
## - BsmtFullBath    1 3.1502e+08 6.1958e+11 29474
## - Foundation      5 3.7998e+09 6.2307e+11 29475
## - HalfBath         1 4.5181e+08 6.1972e+11 29475
## - SaleCondition    5 3.9368e+09 6.2320e+11 29475
## - BsmtFinType1     5 3.9668e+09 6.2323e+11 29475
## - YrSold           1 6.2341e+08 6.1989e+11 29475
## - LotFrontage      1 8.0075e+08 6.2007e+11 29476
## - MasVnrType       3 2.5382e+09 6.2181e+11 29476
## <none>              6.1927e+11 29476
## - Utilities        1 1.0454e+09 6.2031e+11 29476
## - BldgType          4 3.6016e+09 6.2287e+11 29476
## - Fence             4 3.7112e+09 6.2298e+11 29476
## - X3SsnPorch        1 1.1593e+09 6.2043e+11 29476
## - GarageCars        1 1.2235e+09 6.2049e+11 29477
## - BsmtCond          3 3.0036e+09 6.2227e+11 29477
## - FullBath          1 1.3569e+09 6.2062e+11 29477
## - MSZoning          4 3.9133e+09 6.2318e+11 29477
## - RoofStyle         5 4.7698e+09 6.2404e+11 29477
## - MoSold            1 1.8040e+09 6.2107e+11 29478
## - Exterior1st       14 1.2973e+10 6.3224e+11 29478
## - TotRmsAbvGrd     1 1.9076e+09 6.2117e+11 29478
## - YearRemodAdd      1 1.9571e+09 6.2122e+11 29478
## - GarageCond         4 5.7960e+09 6.2506e+11 29481
## - GarageArea         1 3.2625e+09 6.2253e+11 29482
## - WoodDeckSF        1 3.2742e+09 6.2254e+11 29482
## - Fireplaces         1 3.3524e+09 6.2262e+11 29482
## - KitchenAbvGr      1 3.6231e+09 6.2289e+11 29482
## - Street             1 3.7171e+09 6.2298e+11 29482
## - BedroomAbvGr      1 3.8709e+09 6.2314e+11 29483
## - ScreenPorch        1 4.2098e+09 6.2348e+11 29484
## - LandContour        3 5.9645e+09 6.2523e+11 29484
## - PoolArea           1 5.0111e+09 6.2428e+11 29486
## - LotConfig          4 8.3502e+09 6.2762e+11 29487
## - BsmtFinSF2         1 5.9434e+09 6.2521e+11 29488
## - GarageQual         4 9.1434e+09 6.2841e+11 29489
## - MasVnrArea         1 6.7454e+09 6.2601e+11 29490
## - PoolQC             3 9.2243e+09 6.2849e+11 29491
## + Exterior2nd        14 4.4552e+09 6.1481e+11 29493
## - LandSlope          2 9.7044e+09 6.2897e+11 29494

```

```

## - ExterQual      3 1.0635e+10 6.2990e+11 29495
## - YearBuilt     1 9.2911e+09 6.2856e+11 29496
## - BsmtUnfSF     1 9.4552e+09 6.2872e+11 29496
## - Functional     6 1.4353e+10 6.3362e+11 29497
## - Condition1     8 1.9740e+10 6.3901e+11 29506
## - BsmtQual      3 1.6928e+10 6.3620e+11 29509
## - LotArea        1 1.9057e+10 6.3832e+11 29518
## - BsmtExposure   3 2.3036e+10 6.4230e+11 29523
## - KitchenQual    3 2.4085e+10 6.4335e+11 29526
## - OverallQual    1 2.3613e+10 6.4288e+11 29528
## - OverallCond    1 2.3809e+10 6.4308e+11 29529
## - BsmtFinSF1     1 2.7339e+10 6.4661e+11 29537
## - X1stFlrSF      1 3.4179e+10 6.5345e+11 29552
## - X2ndFlrSF      1 6.2601e+10 6.8187e+11 29614
## - Condition2      7 7.8777e+10 6.9804e+11 29637
## - RoofMatl       7 8.1938e+10 7.0121e+11 29643
## - Neighborhood   24 1.0502e+11 7.2429e+11 29656
##
## Step: AIC=29468.47
## SalePrice ~ MSSubClass + MSZoning + LotFrontage + LotArea + Street +
##           Alley + LotShape + LandContour + Utilities + LotConfig +
##           LandSlope + Neighborhood + Condition1 + Condition2 + BldgType +
##           HouseStyle + OverallQual + OverallCond + YearBuilt + YearRemodAdd +
##           RoofStyle + RoofMatl + Exterior1st + MasVnrType + MasVnrArea +
##           ExterQual + ExterCond + Foundation + BsmtQual + BsmtCond +
##           BsmtExposure + BsmtFinType1 + BsmtFinSF1 + BsmtFinType2 +
##           BsmtFinSF2 + BsmtUnfSF + HeatingQC + CentralAir + Electrical +
##           X1stFlrSF + X2ndFlrSF + LowQualFinSF + BsmtFullBath + BsmtHalfBath +
##           FullBath + HalfBath + BedroomAbvGr + KitchenAbvGr + KitchenQual +
##           TotRmsAbvGrd + Functional + Fireplaces + FireplaceQu + GarageType +
##           GarageYrBlt + GarageFinish + GarageCars + GarageArea + GarageQual +
##           GarageCond + PavedDrive + WoodDeckSF + OpenPorchSF + EnclosedPorch +
##           X3SsnPorch + ScreenPorch + PoolArea + PoolQC + Fence + MiscFeature +
##           MiscVal + MoSold + YrSold + SaleType + SaleCondition
##
##              Df  Sum of Sq      RSS      AIC
## - MiscFeature    4 7.4003e+08 6.2114e+11 29462
## - ExterCond      4 9.4963e+08 6.2135e+11 29463
## - Electrical     4 9.7704e+08 6.2138e+11 29463
## - SaleType       8 4.3955e+09 6.2480e+11 29463
## - HouseStyle     7 4.2653e+09 6.2467e+11 29464
## - Alley          2 6.6219e+07 6.2047e+11 29465
## - PavedDrive     2 3.5636e+08 6.2076e+11 29465
## - BsmtFinType2   5 3.0141e+09 6.2342e+11 29466
## - GarageType     5 3.0397e+09 6.2344e+11 29466
## - LotShape        3 1.5347e+09 6.2194e+11 29466
## - HeatingQC       4 2.3970e+09 6.2280e+11 29466
## - FireplaceQu    5 3.4130e+09 6.2382e+11 29466
## - MiscVal         1 6.8042e+06 6.2041e+11 29466
## - BsmtHalfBath   1 1.1763e+07 6.2042e+11 29466
## - CentralAir      1 1.2444e+07 6.2042e+11 29466
## - OpenPorchSF     1 1.5628e+07 6.2042e+11 29466
## - EnclosedPorch   1 3.1963e+07 6.2044e+11 29466
## - LowQualFinSF   1 4.1248e+07 6.2045e+11 29467

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## - GarageFinish      2 9.0407e+08 6.2131e+11 29467
## - GarageYrBlt      1 1.6976e+08 6.2057e+11 29467
## - MSSubClass        1 2.4432e+08 6.2065e+11 29467
## - BsmtFullBath     1 3.3153e+08 6.2074e+11 29467
## - Foundation       5 3.7757e+09 6.2418e+11 29467
## - HalfBath          1 4.7559e+08 6.2088e+11 29468
## - SaleCondition     5 4.0503e+09 6.2445e+11 29468
## - YrSold            1 6.7825e+08 6.2108e+11 29468
## - LotFrontage       1 8.1668e+08 6.2122e+11 29468
## - BsmtFinType1      5 4.2519e+09 6.2466e+11 29468
## - MasVnrType        3 2.5472e+09 6.2295e+11 29468
## <none>              6.2040e+11 29468
## - BldgType          4 3.5816e+09 6.2399e+11 29469
## - Utilities         1 1.0919e+09 6.2150e+11 29469
## - X3SsnPorch        1 1.1557e+09 6.2156e+11 29469
## - Fence              4 3.7739e+09 6.2418e+11 29469
## - GarageCars         1 1.2483e+09 6.2165e+11 29469
## - RoofStyle          5 4.7835e+09 6.2519e+11 29470
## - BsmtCond           3 3.1190e+09 6.2352e+11 29470
## - MSZoning           4 3.9796e+09 6.2438e+11 29470
## - FullBath           1 1.4658e+09 6.2187e+11 29470
## - MoSold              1 1.8442e+09 6.2225e+11 29471
## - YearRemodAdd       1 1.9505e+09 6.2235e+11 29471
## - TotRmsAbvGrd       1 2.0225e+09 6.2243e+11 29471
## - Exterior1st        14 1.3404e+10 6.3381e+11 29472
## - GarageArea          1 3.1043e+09 6.2351e+11 29474
## - KitchenAbvGr        1 3.2312e+09 6.2364e+11 29474
## - WoodDeckSF          1 3.3600e+09 6.2376e+11 29474
## - GarageCond          4 5.9780e+09 6.2638e+11 29474
## - Fireplaces          1 3.4322e+09 6.2384e+11 29474
## - Street              1 3.6687e+09 6.2407e+11 29475
## - BedroomAbvGr        1 3.8969e+09 6.2430e+11 29476
## + Heating              5 1.1370e+09 6.1927e+11 29476
## - LandContour         3 5.8498e+09 6.2625e+11 29476
## - ScreenPorch          1 4.2480e+09 6.2465e+11 29476
## - PoolArea             1 5.1231e+09 6.2553e+11 29478
## - LotConfig            4 8.4621e+09 6.2887e+11 29480
## - BsmtFinSF2           1 6.0496e+09 6.2645e+11 29481
## - GarageQual            4 9.4398e+09 6.2984e+11 29482
## - MasVnrArea            1 6.9898e+09 6.2739e+11 29483
## - PoolQC                3 9.3003e+09 6.2970e+11 29484
## + Exterior2nd          14 4.1624e+09 6.1624e+11 29487
## - LandSlope             2 9.6412e+09 6.3005e+11 29487
## - ExterQual             3 1.0657e+10 6.3106e+11 29487
## - YearBuilt              1 9.4936e+09 6.2990e+11 29489
## - BsmtUnfSF             1 9.7245e+09 6.3013e+11 29489
## - Functional            6 1.4152e+10 6.3456e+11 29489
## - Condition1            8 2.0240e+10 6.4064e+11 29499
## - BsmtQual              3 1.7324e+10 6.3773e+11 29503
## - LotArea                 1 1.9154e+10 6.3956e+11 29511
## - BsmtExposure           3 2.3256e+10 6.4366e+11 29516
## - KitchenQual            3 2.4147e+10 6.4455e+11 29518
## - OverallQual            1 2.3103e+10 6.4351e+11 29520
## - OverallCond            1 2.4212e+10 6.4462e+11 29522

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## - BsmtFinSF1      1 2.7867e+10 6.4827e+11 29531
## - X1stFlrSF       1 3.3652e+10 6.5406e+11 29544
## - X2ndFlrSF       1 6.2191e+10 6.8260e+11 29606
## - Condition2      7 7.8824e+10 6.9923e+11 29629
## - RoofMatl        7 8.2080e+10 7.0248e+11 29636
## - Neighborhood    24 1.0664e+11 7.2705e+11 29652
##
## Step: AIC=29462.21
## SalePrice ~ MSSubClass + MSZoning + LotFrontage + LotArea + Street +
##             Alley + LotShape + LandContour + Utilities + LotConfig +
##             LandSlope + Neighborhood + Condition1 + Condition2 + BldgType +
##             HouseStyle + OverallQual + OverallCond + YearBuilt + YearRemodAdd +
##             RoofStyle + RoofMatl + Exterior1st + MasVnrType + MasVnrArea +
##             ExterQual + ExterCond + Foundation + BsmtQual + BsmtCond +
##             BsmtExposure + BsmtFinType1 + BsmtFinSF1 + BsmtFinType2 +
##             BsmtFinSF2 + BsmtUnfSF + HeatingQC + CentralAir + Electrical +
##             X1stFlrSF + X2ndFlrSF + LowQualFinSF + BsmtFullBath + BsmtHalfBath +
##             FullBath + HalfBath + BedroomAbvGr + KitchenAbvGr + KitchenQual +
##             TotRmsAbvGrd + Functional + Fireplaces + FireplaceQu + GarageType +
##             GarageYrBlt + GarageFinish + GarageCars + GarageArea + GarageQual +
##             GarageCond + PavedDrive + WoodDeckSF + OpenPorchSF + EnclosedPorch +
##             X3SsnPorch + ScreenPorch + PoolArea + PoolQC + Fence + MiscVal +
##             MoSold + YrSold + SaleType + SaleCondition
##
##              Df  Sum of Sq      RSS     AIC
## - Electrical      4 9.1485e+08 6.2206e+11 29456
## - ExterCond       4 1.0681e+09 6.2221e+11 29457
## - SaleType        8 4.4923e+09 6.2564e+11 29457
## - Alley           2 8.0135e+07 6.2122e+11 29458
## - HouseStyle      7 4.4578e+09 6.2560e+11 29459
## - PavedDrive      2 3.7297e+08 6.2152e+11 29459
## - BsmtFinType2    5 2.9574e+09 6.2410e+11 29459
## - GarageType      5 3.0019e+09 6.2415e+11 29459
## - LotShape         3 1.4713e+09 6.2262e+11 29460
## - HeatingQC        4 2.3940e+09 6.2354e+11 29460
## - BsmtHalfBath    1 7.2997e+06 6.2115e+11 29460
## - CentralAir       1 1.2456e+07 6.2116e+11 29460
## - LowQualFinSF    1 1.7789e+07 6.2116e+11 29460
## - OpenPorchSF      1 2.5754e+07 6.2117e+11 29460
## - MiscVal          1 3.5370e+07 6.2118e+11 29460
## - EnclosedPorch    1 3.9561e+07 6.2118e+11 29460
## - GarageFinish     2 9.2095e+08 6.2207e+11 29460
## - FireplaceQu      5 3.5044e+09 6.2465e+11 29460
## - GarageYrBlt      1 1.4690e+08 6.2129e+11 29461
## - Foundation       5 3.6009e+09 6.2475e+11 29461
## - MSSubClass        1 2.2136e+08 6.2137e+11 29461
## - BsmtFullBath     1 3.2775e+08 6.2147e+11 29461
## - HalfBath          1 4.5366e+08 6.2160e+11 29461
## - SaleCondition     5 3.9991e+09 6.2514e+11 29462
## - YrSold            1 6.1297e+08 6.2176e+11 29462
## - LotFrontage       1 7.4631e+08 6.2189e+11 29462
## <none>                  6.2114e+11 29462
## - BsmtFinType1      5 4.2903e+09 6.2543e+11 29462
## - MasVnrType         3 2.5905e+09 6.2373e+11 29462

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## - Utilities      1 1.0878e+09 6.2223e+11 29463
## - BldgType       4 3.7056e+09 6.2485e+11 29463
## - X3SsnPorch    1 1.1756e+09 6.2232e+11 29463
## - GarageCars     1 1.2621e+09 6.2241e+11 29463
## - RoofStyle      5 4.8340e+09 6.2598e+11 29464
## - Fence          4 3.9860e+09 6.2513e+11 29464
## - MSZoning       4 4.0035e+09 6.2515e+11 29464
## - BsmtCond       3 3.1533e+09 6.2430e+11 29464
## - FullBath        1 1.5429e+09 6.2269e+11 29464
## - YearRemodAdd   1 1.6996e+09 6.2284e+11 29464
## - MoSold          1 1.7057e+09 6.2285e+11 29464
## - Exterior1st    14 1.3199e+10 6.3434e+11 29465
## - TotRmsAbvGrd   1 2.1344e+09 6.2328e+11 29465
## - GarageArea      1 3.0583e+09 6.2420e+11 29467
## - KitchenAbvGr   1 3.1724e+09 6.2432e+11 29468
## - GarageCond      4 5.7757e+09 6.2692e+11 29468
## - WoodDeckSF      1 3.4757e+09 6.2462e+11 29468
## + MiscFeature     4 7.4003e+08 6.2040e+11 29468
## - Fireplaces      1 3.5833e+09 6.2473e+11 29469
## - Street           1 3.5916e+09 6.2474e+11 29469
## - BedroomAbvGr   1 3.9378e+09 6.2508e+11 29469
## + Heating          5 1.1374e+09 6.2001e+11 29470
## - LandContour     3 5.9956e+09 6.2714e+11 29470
## - ScreenPorch      1 4.5081e+09 6.2565e+11 29471
## - LotConfig         4 8.2395e+09 6.2938e+11 29474
## - BsmtFinSF2       1 6.0009e+09 6.2715e+11 29474
## - PoolArea          1 6.3876e+09 6.2753e+11 29475
## - GarageQual        4 9.3355e+09 6.3048e+11 29476
## - MasVnrArea        1 7.0629e+09 6.2821e+11 29477
## + Exterior2nd      14 4.1467e+09 6.1700e+11 29480
## - LandSlope          2 9.7483e+09 6.3089e+11 29481
## - ExterQual          3 1.0948e+10 6.3209e+11 29482
## - YearBuilt          1 9.5758e+09 6.3072e+11 29482
## - BsmtUnfSF          1 9.7513e+09 6.3090e+11 29483
## - Functional          6 1.4235e+10 6.3538e+11 29483
## - PoolQC              3 1.4844e+10 6.3599e+11 29491
## - Condition1          8 2.0342e+10 6.4149e+11 29493
## - BsmtQual             3 1.7488e+10 6.3863e+11 29497
## - LotArea              1 1.9910e+10 6.4105e+11 29506
## - BsmtExposure         3 2.3035e+10 6.4418e+11 29509
## - KitchenQual           3 2.4164e+10 6.4531e+11 29512
## - OverallQual           1 2.2959e+10 6.4410e+11 29513
## - OverallCond           1 2.4995e+10 6.4614e+11 29518
## - BsmtFinSF1            1 2.8058e+10 6.4920e+11 29525
## - X1stFlrSF              1 3.3738e+10 6.5488e+11 29537
## - X2ndFlrSF              1 6.2740e+10 6.8388e+11 29601
## - Condition2              7 8.0887e+10 7.0203e+11 29627
## - Neighborhood           24 1.0609e+11 7.2723e+11 29644
## - RoofMatl                7 1.0235e+11 7.2350e+11 29671
##
## Step: AIC=29456.36
## SalePrice ~ MSSubClass + MSZoning + LotFrontage + LotArea + Street +
##           Alley + LotShape + LandContour + Utilities + LotConfig +
##           LandSlope + Neighborhood + Condition1 + Condition2 + BldgType +

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## HouseStyle + OverallQual + OverallCond + YearBuilt + YearRemodAdd +
## RoofStyle + RoofMatl + Exterior1st + MasVnrType + MasVnrArea +
## ExterQual + ExterCond + Foundation + BsmtQual + BsmtCond +
## BsmtExposure + BsmtFinType1 + BsmtFinSF1 + BsmtFinType2 +
## BsmtFinSF2 + BsmtUnfSF + HeatingQC + CentralAir + X1stFlrSF +
## X2ndFlrSF + LowQualFinSF + BsmtFullBath + BsmtHalfBath +
## FullBath + HalfBath + BedroomAbvGr + KitchenAbvGr + KitchenQual +
## TotRmsAbvGrd + Functional + Fireplaces + FireplaceQu + GarageType +
## GarageYrBlt + GarageFinish + GarageCars + GarageArea + GarageQual +
## GarageCond + PavedDrive + WoodDeckSF + OpenPorchSF + EnclosedPorch +
## X3SsnPorch + ScreenPorch + PoolArea + PoolQC + Fence + MiscVal +
## MoSold + YrSold + SaleType + SaleCondition
##
##          Df  Sum of Sq      RSS     AIC
## - SaleType      8 4.4448e+09 6.2650e+11 29451
## - ExterCond      4 1.1731e+09 6.2323e+11 29451
## - Alley          2 8.0357e+07 6.2214e+11 29452
## - GarageType      5 2.8176e+09 6.2488e+11 29453
## - BsmtFinType2      5 2.9117e+09 6.2497e+11 29453
## - PavedDrive      2 3.8449e+08 6.2244e+11 29453
## - LotShape         3 1.3689e+09 6.2343e+11 29454
## - HouseStyle        7 4.8040e+09 6.2686e+11 29454
## - HeatingQC         4 2.4876e+09 6.2455e+11 29454
## - CentralAir         1 5.2066e+04 6.2206e+11 29454
## - BsmtHalfBath       1 1.0366e+07 6.2207e+11 29454
## - LowQualFinSF       1 1.3122e+07 6.2207e+11 29454
## - MiscVal            1 2.6381e+07 6.2209e+11 29454
## - OpenPorchSF         1 2.7507e+07 6.2209e+11 29454
## - EnclosedPorch       1 5.4111e+07 6.2211e+11 29454
## - GarageFinish         2 9.2735e+08 6.2299e+11 29454
## - FireplaceQu         5 3.5852e+09 6.2564e+11 29455
## - GarageYrBlt         1 1.7326e+08 6.2223e+11 29455
## - MSSubClass           1 2.2156e+08 6.2228e+11 29455
## - Foundation           5 3.6974e+09 6.2576e+11 29455
## - BsmtFullBath         1 3.4369e+08 6.2240e+11 29455
## - HalfBath              1 4.4539e+08 6.2250e+11 29455
## - YrSold                 1 6.6384e+08 6.2272e+11 29456
## - LotFrontage           1 7.8164e+08 6.2284e+11 29456
## - SaleCondition          5 4.2728e+09 6.2633e+11 29456
## <none>                      6.2206e+11 29456
## - MasVnrType            3 2.6119e+09 6.2467e+11 29456
## - Utilities              1 9.4368e+08 6.2300e+11 29457
## - BsmtFinType1           5 4.3805e+09 6.2644e+11 29457
## - BldgType                4 3.7507e+09 6.2581e+11 29457
## - RoofStyle               5 4.6164e+09 6.2668e+11 29457
## - X3SsnPorch              1 1.1979e+09 6.2326e+11 29457
## - GarageCars              1 1.2225e+09 6.2328e+11 29457
## - Fence                     4 3.9057e+09 6.2596e+11 29458
## - MSZoning                  4 3.9588e+09 6.2602e+11 29458
## - FullBath                   1 1.4115e+09 6.2347e+11 29458
## - BsmtCond                  3 3.2986e+09 6.2536e+11 29458
## - YearRemodAdd              1 1.6009e+09 6.2366e+11 29458
## - MoSold                     1 1.7471e+09 6.2381e+11 29458
## - TotRmsAbvGrd              1 2.1598e+09 6.2422e+11 29459

```

```

## - Exterior1st 14 1.3878e+10 6.3594e+11 29461
## - GarageArea 1 2.9808e+09 6.2504e+11 29461
## - KitchenAbvGr 1 3.0776e+09 6.2514e+11 29462
## - GarageCond 4 5.8425e+09 6.2790e+11 29462
## + Electrical 4 9.1485e+08 6.2114e+11 29462
## - WoodDeckSF 1 3.4485e+09 6.2551e+11 29462
## + MiscFeature 4 6.7784e+08 6.2138e+11 29463
## - Fireplaces 1 3.6043e+09 6.2566e+11 29463
## - Street 1 3.7007e+09 6.2576e+11 29463
## + Heating 5 1.2049e+09 6.2085e+11 29464
## - BedroomAbvGr 1 4.1153e+09 6.2617e+11 29464
## - LandContour 3 5.9861e+09 6.2805e+11 29464
## - ScreenPorch 1 4.4832e+09 6.2654e+11 29465
## - LotConfig 4 8.1767e+09 6.3024e+11 29467
## - BsmtFinSF2 1 5.9828e+09 6.2804e+11 29468
## - PoolArea 1 6.4959e+09 6.2855e+11 29470
## - MasVnrArea 1 7.1367e+09 6.2920e+11 29471
## - GarageQual 4 1.0028e+10 6.3209e+11 29472
## + Exterior2nd 14 4.3223e+09 6.1774e+11 29474
## - LandSlope 2 9.5777e+09 6.3164e+11 29475
## - ExterQual 3 1.1180e+10 6.3324e+11 29476
## - YearBuilt 1 9.5401e+09 6.3160e+11 29477
## - BsmtUnfSF 1 9.7523e+09 6.3181e+11 29477
## - Functional 6 1.4448e+10 6.3651e+11 29478
## - PoolQC 3 1.4884e+10 6.3694e+11 29485
## - Condition1 8 2.0135e+10 6.4219e+11 29487
## - BsmtQual 3 1.7684e+10 6.3974e+11 29491
## - LotArea 1 1.9770e+10 6.4183e+11 29500
## - BsmtExposure 3 2.3454e+10 6.4551e+11 29504
## - KitchenQual 3 2.4235e+10 6.4629e+11 29506
## - OverallQual 1 2.2733e+10 6.4479e+11 29507
## - OverallCond 1 2.4714e+10 6.4677e+11 29511
## - BsmtFinSF1 1 2.7885e+10 6.4994e+11 29518
## - X1stFlrSF 1 3.3959e+10 6.5602e+11 29532
## - X2ndFlrSF 1 6.3586e+10 6.8565e+11 29596
## - Condition2 7 8.0680e+10 7.0274e+11 29620
## - Neighborhood 24 1.0613e+11 7.2818e+11 29638
## - RoofMatl 7 1.0202e+11 7.2408e+11 29664
##
## Step: AIC=29450.75
## SalePrice ~ MSSubClass + MSZoning + LotFrontage + LotArea + Street +
## Alley + LotShape + LandContour + Utilities + LotConfig +
## LandSlope + Neighborhood + Condition1 + Condition2 + BldgType +
## HouseStyle + OverallQual + OverallCond + YearBuilt + YearRemodAdd +
## RoofStyle + RoofMatl + Exterior1st + MasVnrType + MasVnrArea +
## ExterQual + ExterCond + Foundation + BsmtQual + BsmtCond +
## BsmtExposure + BsmtFinType1 + BsmtFinSF1 + BsmtFinType2 +
## BsmtFinSF2 + BsmtUnfSF + HeatingQC + CentralAir + X1stFlrSF +
## X2ndFlrSF + LowQualFinSF + BsmtFullBath + BsmtHalfBath +
## FullBath + HalfBath + BedroomAbvGr + KitchenAbvGr + KitchenQual +
## TotRmsAbvGrd + Functional + Fireplaces + FireplaceQu + GarageType +
## GarageYrBlt + GarageFinish + GarageCars + GarageArea + GarageQual +
## GarageCond + PavedDrive + WoodDeckSF + OpenPorchSF + EnclosedPorch +
## X3SsnPorch + ScreenPorch + PoolArea + PoolQC + Fence + MiscVal +

```

```

##      MoSold + YrSold + SaleCondition
##
##              Df  Sum of Sq      RSS   AIC
## - ExterCond      4 1.2801e+09 6.2778e+11 29446
## - GarageType      5 2.7270e+09 6.2923e+11 29447
## - Alley           2 1.4942e+08 6.2665e+11 29447
## - PavedDrive      2 4.5670e+08 6.2696e+11 29448
## - HeatingQC       4 2.2617e+09 6.2877e+11 29448
## - LotShape         3 1.4357e+09 6.2794e+11 29448
## - BsmtFinType2     5 3.3551e+09 6.2986e+11 29449
## - BsmtHalfBath     1 3.4526e+06 6.2651e+11 29449
## - LowQualFinSF     1 4.1601e+06 6.2651e+11 29449
## - CentralAir        1 4.7971e+06 6.2651e+11 29449
## - OpenPorchSF       1 6.4269e+06 6.2651e+11 29449
## - MiscVal          1 1.8117e+07 6.2652e+11 29449
## - EnclosedPorch     1 4.7747e+07 6.2655e+11 29449
## - GarageFinish       2 9.1320e+08 6.2742e+11 29449
## - GarageYrBlt       1 1.2115e+08 6.2662e+11 29449
## - MSSubClass         1 1.6034e+08 6.2666e+11 29449
## - Foundation        5 3.6119e+09 6.3012e+11 29449
## - HouseStyle         7 5.3996e+09 6.3190e+11 29449
## - BsmtFullBath       1 3.2406e+08 6.2683e+11 29450
## - FireplaceQu        5 3.7867e+09 6.3029e+11 29450
## - HalfBath           1 4.3891e+08 6.2694e+11 29450
## - YrSold             1 6.7723e+08 6.2718e+11 29450
## - MasVnrType          3 2.5360e+09 6.2904e+11 29451
## <none>                  6.2650e+11 29451
## - Utilities          1 8.7691e+08 6.2738e+11 29451
## - LotFrontage         1 9.2744e+08 6.2743e+11 29451
## - BsmtFinType1        5 4.3784e+09 6.3088e+11 29451
## - X3SsnPorch          1 1.1258e+09 6.2763e+11 29451
## - GarageCars          1 1.1403e+09 6.2764e+11 29451
## - MSZoning            4 3.7867e+09 6.3029e+11 29452
## - BldgType            4 3.9148e+09 6.3042e+11 29452
## - FullBath            1 1.3467e+09 6.2785e+11 29452
## - BsmtCond            3 3.1916e+09 6.2970e+11 29452
## - Fence               4 4.0993e+09 6.3060e+11 29452
## - MoSold              1 1.5161e+09 6.2802e+11 29452
## - RoofStyle            5 5.0398e+09 6.3154e+11 29452
## - YearRemodAdd         1 1.8524e+09 6.2836e+11 29453
## - TotRmsAbvGrd         1 2.3464e+09 6.2885e+11 29454
## - GarageArea            1 2.9297e+09 6.2943e+11 29456
## - Exterior1st          14 1.4344e+10 6.4085e+11 29456
## - KitchenAbvGr          1 3.2477e+09 6.2975e+11 29456
## + SaleType             8 4.4448e+09 6.2206e+11 29456
## - Street                1 3.3337e+09 6.2984e+11 29456
## - WoodDeckSF            1 3.3809e+09 6.2988e+11 29457
## - GarageCond            4 5.9996e+09 6.3250e+11 29457
## + Electrical            4 8.6729e+08 6.2564e+11 29457
## + MiscFeature            4 7.9128e+08 6.2571e+11 29457
## - Fireplaces            1 3.7331e+09 6.3024e+11 29457
## + Heating                 5 1.1172e+09 6.2539e+11 29458
## - BedroomAbvGr          1 4.1162e+09 6.3062e+11 29458
## - LandContour            3 5.8646e+09 6.3237e+11 29458

```

```

## - ScreenPorch      1 4.2131e+09 6.3072e+11 29458
## - BsmtFinSF2      1 6.2069e+09 6.3271e+11 29463
## - LotConfig        4 9.1938e+09 6.3570e+11 29464
## - PoolArea         1 6.9111e+09 6.3341e+11 29465
## - MasVnrArea       1 7.1231e+09 6.3363e+11 29465
## - GarageQual       4 1.0500e+10 6.3700e+11 29467
## + Exterior2nd     14 4.3132e+09 6.2219e+11 29469
## - YearBuilt        1 9.5711e+09 6.3607e+11 29471
## - BsmtUnfSF        1 9.6221e+09 6.3613e+11 29471
## - Functional       6 1.4208e+10 6.4071e+11 29472
## - ExterQual        3 1.1777e+10 6.3828e+11 29472
## - LandSlope         2 1.1001e+10 6.3750e+11 29472
## - PoolQC           3 1.4755e+10 6.4126e+11 29479
## - SaleCondition    5 1.6896e+10 6.4340e+11 29480
## - Condition1       8 2.0015e+10 6.4652e+11 29481
## - BsmtQual          3 1.8150e+10 6.4465e+11 29486
## - LotArea           1 2.1003e+10 6.4751e+11 29497
## - KitchenQual       3 2.3006e+10 6.4951e+11 29497
## - BsmtExposure     3 2.4954e+10 6.5146e+11 29502
## - OverallQual       1 2.3558e+10 6.5006e+11 29503
## - OverallCond       1 2.4023e+10 6.5053e+11 29504
## - BsmtFinSF1        1 2.7870e+10 6.5437e+11 29512
## - X1stFlrSF         1 3.4700e+10 6.6120e+11 29528
## - X2ndFlrSF         1 6.4557e+10 6.9106e+11 29592
## - Condition2        7 8.1807e+10 7.0831e+11 29616
## - Neighborhood      24 1.0496e+11 7.3147e+11 29629
## - RoofMatl          7 1.0275e+11 7.2925e+11 29658
##
## Step: AIC=29445.73
## SalePrice ~ MSSubClass + MSZoning + LotFrontage + LotArea + Street +
## Alley + LotShape + LandContour + Utilities + LotConfig +
## LandSlope + Neighborhood + Condition1 + Condition2 + BldgType +
## HouseStyle + OverallQual + OverallCond + YearBuilt + YearRemodAdd +
## RoofStyle + RoofMatl + Exterior1st + MasVnrType + MasVnrArea +
## ExterQual + Foundation + BsmtQual + BsmtCond + BsmtExposure +
## BsmtFinType1 + BsmtFinSF1 + BsmtFinType2 + BsmtFinSF2 + BsmtUnfSF +
## HeatingQC + CentralAir + X1stFlrSF + X2ndFlrSF + LowQualFinSF +
## BsmtFullBath + BsmtHalfBath + FullBath + HalfBath + BedroomAbvGr +
## KitchenAbvGr + KitchenQual + TotRmsAbvGrd + Functional +
## Fireplaces + FireplaceQu + GarageType + GarageYrBlt + GarageFinish +
## GarageCars + GarageArea + GarageQual + GarageCond + PavedDrive +
## WoodDeckSF + OpenPorchSF + EnclosedPorch + X3SsnPorch + ScreenPorch +
## PoolArea + PoolQC + Fence + MiscVal + MoSold + YrSold + SaleCondition
##
##                               Df  Sum of Sq      RSS      AIC
## - GarageType            5 2.6475e+09 6.3043e+11 29442
## - Alley                  2 2.1556e+08 6.2800e+11 29442
## - PavedDrive             2 4.9658e+08 6.2828e+11 29443
## - HeatingQC              4 2.2675e+09 6.3005e+11 29443
## - LotShape                3 1.4590e+09 6.2924e+11 29443
## - BsmtFinType2            5 3.3796e+09 6.3116e+11 29444
## - HouseStyle              7 5.1578e+09 6.3294e+11 29444
## - GarageFinish             2 8.4721e+08 6.2863e+11 29444
## - CentralAir              1 1.5874e+05 6.2778e+11 29444

```

```

## - LowQualFinSF      1 2.8202e+06 6.2779e+11 29444
## - MiscVal          1 3.1455e+06 6.2779e+11 29444
## - OpenPorchSF       1 4.3542e+06 6.2779e+11 29444
## - BsmtHalfBath     1 8.2396e+06 6.2779e+11 29444
## - EnclosedPorch     1 4.3994e+07 6.2783e+11 29444
## - Foundation        5 3.5397e+09 6.3132e+11 29444
## - GarageYrBlt       1 1.0687e+08 6.2789e+11 29444
## - MSSubClass         1 1.5342e+08 6.2794e+11 29444
## - FireplaceQu       5 3.6804e+09 6.3146e+11 29444
## - BsmtFullBath      1 3.0698e+08 6.2809e+11 29444
## - HalfBath          1 4.3691e+08 6.2822e+11 29445
## - YrSold            1 7.2335e+08 6.2851e+11 29445
## - MasVnrType         3 2.5369e+09 6.3032e+11 29446
## - Utilities          1 8.5567e+08 6.2864e+11 29446
## <none>                  6.2778e+11 29446
## - LotFrontage        1 8.9034e+08 6.2867e+11 29446
## - BsmtFinType1       5 4.4554e+09 6.3224e+11 29446
## - X3SsnPorch         1 1.1036e+09 6.2889e+11 29446
## - FullBath           1 1.2182e+09 6.2900e+11 29447
## - MSZoning            4 3.8160e+09 6.3160e+11 29447
## - GarageCars          1 1.3119e+09 6.2910e+11 29447
## - MoSold              1 1.5062e+09 6.2929e+11 29447
## - BldgType            4 4.1713e+09 6.3196e+11 29447
## - Fence                4 4.2383e+09 6.3202e+11 29448
## - RoofStyle            5 5.1540e+09 6.3294e+11 29448
## - BsmtCond             3 3.4983e+09 6.3128e+11 29448
## - YearRemodAdd         1 1.8505e+09 6.2963e+11 29448
## - TotRmsAbvGrd        1 2.2973e+09 6.3008e+11 29449
## - GarageArea            1 2.8140e+09 6.3060e+11 29450
## + ExterCond            4 1.2801e+09 6.2650e+11 29451
## - GarageCond            4 5.7535e+09 6.3354e+11 29451
## - Exterior1st          14 1.4511e+10 6.4230e+11 29451
## + SaleType              8 4.5518e+09 6.2323e+11 29451
## - WoodDeckSF           1 3.2475e+09 6.3103e+11 29451
## + Electrical            4 9.5288e+08 6.2683e+11 29452
## - KitchenAbvGr          1 3.3747e+09 6.3116e+11 29452
## + MiscFeature            4 9.1988e+08 6.2686e+11 29452
## - Street                 1 3.6433e+09 6.3143e+11 29452
## - Fireplaces             1 3.7012e+09 6.3149e+11 29452
## + Heating                  5 1.2377e+09 6.2655e+11 29453
## - ScreenPorch            1 4.1667e+09 6.3195e+11 29453
## - BedroomAbvGr          1 4.2315e+09 6.3202e+11 29454
## - LandContour            3 6.1212e+09 6.3391e+11 29454
## - BsmtFinSF2             1 6.0509e+09 6.3383e+11 29458
## - LotConfig               4 9.0999e+09 6.3688e+11 29459
## - PoolArea                 1 6.6870e+09 6.3447e+11 29459
## - MasVnrArea              1 6.9490e+09 6.3473e+11 29460
## - GarageQual                4 1.0097e+10 6.3788e+11 29461
## + Exterior2nd            14 4.1684e+09 6.2362e+11 29464
## - Functional                 6 1.3824e+10 6.4161e+11 29466
## - YearBuilt                  1 9.7376e+09 6.3752e+11 29466
## - BsmtUnfSF                  1 9.8933e+09 6.3768e+11 29467
## - LandSlope                   2 1.0778e+10 6.3856e+11 29467
## - ExterQual                  3 1.1782e+10 6.3957e+11 29467

```

```

## - PoolQC      3 1.4319e+10 6.4210e+11 29473
## - SaleCondition 5 1.7097e+10 6.4488e+11 29475
## - Condition1    8 2.0430e+10 6.4821e+11 29476
## - BsmtQual      3 1.8481e+10 6.4627e+11 29482
## - LotArea        1 2.0859e+10 6.4864e+11 29492
## - KitchenQual    3 2.3277e+10 6.5106e+11 29493
## - BsmtExposure   3 2.4848e+10 6.5263e+11 29496
## - OverallCond     1 2.3497e+10 6.5128e+11 29497
## - OverallQual     1 2.3960e+10 6.5174e+11 29498
## - BsmtFinSF1      1 2.8250e+10 6.5603e+11 29508
## - X1stFlrSF       1 3.4799e+10 6.6258e+11 29522
## - X2ndFlrSF       1 6.4347e+10 6.9213e+11 29586
## - Condition2      7 8.2749e+10 7.1053e+11 29612
## - Neighborhood    24 1.0566e+11 7.3344e+11 29625
## - RoofMatl        7 1.0329e+11 7.3108e+11 29654
##
## Step: AIC=29441.88
## SalePrice ~ MSSubClass + MSZoning + LotFrontage + LotArea + Street +
##             Alley + LotShape + LandContour + Utilities + LotConfig +
##             LandSlope + Neighborhood + Condition1 + Condition2 + BldgType +
##             HouseStyle + OverallQual + OverallCond + YearBuilt + YearRemodAdd +
##             RoofStyle + RoofMatl + Exterior1st + MasVnrType + MasVnrArea +
##             ExterQual + Foundation + BsmtQual + BsmtCond + BsmtExposure +
##             BsmtFinType1 + BsmtFinSF1 + BsmtFinType2 + BsmtFinSF2 + BsmtUnfSF +
##             HeatingQC + CentralAir + X1stFlrSF + X2ndFlrSF + LowQualFinSF +
##             BsmtFullBath + BsmtHalfBath + FullBath + HalfBath + BedroomAbvGr +
##             KitchenAbvGr + KitchenQual + TotRmsAbvGrd + Functional +
##             Fireplaces + FireplaceQu + GarageYrBlt + GarageFinish + GarageCars +
##             GarageArea + GarageQual + GarageCond + PavedDrive + WoodDeckSF +
##             OpenPorchSF + EnclosedPorch + X3SsnPorch + ScreenPorch +
##             PoolArea + PoolQC + Fence + MiscVal + MoSold + YrSold + SaleCondition
##
##                         Df  Sum of Sq      RSS      AIC
## - Alley            2 1.8121e+08 6.3061e+11 29438
## - LotShape         3 1.2840e+09 6.3172e+11 29439
## - PavedDrive       2 4.3350e+08 6.3086e+11 29439
## - HeatingQC        4 2.2660e+09 6.3270e+11 29439
## - BsmtFinType2     5 3.3055e+09 6.3374e+11 29440
## - Foundation       5 3.3679e+09 6.3380e+11 29440
## - CentralAir       1 1.1091e+06 6.3043e+11 29440
## - MiscVal          1 1.3172e+06 6.3043e+11 29440
## - LowQualFinSF     1 2.2187e+06 6.3043e+11 29440
## - OpenPorchSF       1 3.9006e+06 6.3044e+11 29440
## - BsmtHalfBath     1 2.4601e+07 6.3046e+11 29440
## - GarageYrBlt       1 2.6969e+07 6.3046e+11 29440
## - EnclosedPorch     1 2.9382e+07 6.3046e+11 29440
## - MSSubClass        1 1.6633e+08 6.3060e+11 29440
## - HouseStyle        7 5.3911e+09 6.3582e+11 29440
## - FireplaceQu       5 3.7410e+09 6.3417e+11 29440
## - BsmtFullBath      1 2.9981e+08 6.3073e+11 29441
## - HalfBath          1 3.0293e+08 6.3073e+11 29441
## - GarageFinish       2 1.2342e+09 6.3167e+11 29441
## - BsmtFinType1      5 4.0018e+09 6.3443e+11 29441
## - YrSold            1 5.4971e+08 6.3098e+11 29441

```

```

## - Utilities          1 7.1797e+08 6.3115e+11 29442
## <none>                  6.3043e+11 29442
## - LotFrontage        1 8.7624e+08 6.3131e+11 29442
## - X3SsnPorch         1 9.3960e+08 6.3137e+11 29442
## - MasVnrType          3 2.6976e+09 6.3313e+11 29442
## - FullBath             1 1.0604e+09 6.3149e+11 29442
## - MSZoning              4 3.7124e+09 6.3414e+11 29442
## - MoSold                1 1.2687e+09 6.3170e+11 29443
## - BldgType              4 3.8728e+09 6.3430e+11 29443
## - GarageCars            1 1.3493e+09 6.3178e+11 29443
## - BsmtCond              3 3.3673e+09 6.3380e+11 29444
## - RoofStyle              5 5.1792e+09 6.3561e+11 29444
## - Fence                  4 4.4320e+09 6.3486e+11 29444
## - YearRemodAdd          1 1.8644e+09 6.3230e+11 29444
## - GarageArea             1 2.5081e+09 6.3294e+11 29446
## + GarageType             5 2.6475e+09 6.2778e+11 29446
## - TotRmsAbvGrd          1 2.5831e+09 6.3301e+11 29446
## - WoodDeckSF             1 3.0771e+09 6.3351e+11 29447
## + ExterCond              4 1.2006e+09 6.2923e+11 29447
## - GarageCond              4 5.8590e+09 6.3629e+11 29447
## + SaleType                 8 4.4286e+09 6.2600e+11 29448
## - Exterior1st            14 1.4767e+10 6.4520e+11 29448
## + MiscFeature             4 9.1245e+08 6.2952e+11 29448
## + Electrical              4 7.6878e+08 6.2966e+11 29448
## - Fireplaces              1 3.7837e+09 6.3422e+11 29449
## + Heating                  5 1.3482e+09 6.2908e+11 29449
## - KitchenAbvGr            1 3.8522e+09 6.3428e+11 29449
## - ScreenPorch              1 3.8540e+09 6.3429e+11 29449
## - LandContour              3 6.1443e+09 6.3658e+11 29450
## - BedroomAbvGr            1 4.7113e+09 6.3514e+11 29451
## - Street                   1 4.7257e+09 6.3516e+11 29451
## - BsmtFinSF2              1 5.9415e+09 6.3637e+11 29454
## - LotConfig                  4 8.8602e+09 6.3929e+11 29454
## - PoolArea                  1 6.4492e+09 6.3688e+11 29455
## - GarageQual                 4 1.0140e+10 6.4057e+11 29457
## - MasVnrArea                 1 7.6744e+09 6.3811e+11 29458
## + Exterior2nd              14 3.9091e+09 6.2652e+11 29461
## - Functional                 6 1.3809e+10 6.4424e+11 29462
## - YearBuilt                  1 9.4773e+09 6.3991e+11 29462
## - LandSlope                  2 1.0418e+10 6.4085e+11 29462
## - BsmtUnfSF                  1 9.8832e+09 6.4031e+11 29463
## - ExterQual                  3 1.2099e+10 6.4253e+11 29464
## - PoolQC                      3 1.4264e+10 6.4470e+11 29468
## - Condition1                  8 1.9646e+10 6.5008e+11 29471
## - SaleCondition               5 1.7470e+10 6.4790e+11 29472
## - BsmtQual                     3 1.9120e+10 6.4955e+11 29480
## - LotArea                      1 2.0581e+10 6.5101e+11 29487
## - KitchenQual                  3 2.2778e+10 6.5321e+11 29488
## - BsmtExposure                 3 2.5143e+10 6.5557e+11 29493
## - OverallCond                  1 2.3951e+10 6.5438e+11 29494
## - OverallQual                  1 2.4135e+10 6.5457e+11 29495
## - BsmtFinSF1                    1 2.8556e+10 6.5899e+11 29505
## - X1stFlrSF                      1 3.5769e+10 6.6620e+11 29520
## - X2ndFlrSF                      1 7.4230e+10 7.0466e+11 29602

```

```

## - Condition2      7 8.2955e+10 7.1339e+11 29608
## - Neighborhood   24 1.0735e+11 7.3778e+11 29624
## - RoofMatl       7 1.0317e+11 7.3360e+11 29649
##
## Step: AIC=29438.3
## SalePrice ~ MSSubClass + MSZoning + LotFrontage + LotArea + Street +
##     LotShape + LandContour + Utilities + LotConfig + LandSlope +
##     Neighborhood + Condition1 + Condition2 + BldgType + HouseStyle +
##     OverallQual + OverallCond + YearBuilt + YearRemodAdd + RoofStyle +
##     RoofMatl + Exterior1st + MasVnrType + MasVnrArea + ExterQual +
##     Foundation + BsmtQual + BsmtCond + BsmtExposure + BsmtFinType1 +
##     BsmtFinSF1 + BsmtFinType2 + BsmtFinSF2 + BsmtUnfSF + HeatingQC +
##     CentralAir + X1stFlrSF + X2ndFlrSF + LowQualFinSF + BsmtFullBath +
##     BsmtHalfBath + FullBath + HalfBath + BedroomAbvGr + KitchenAbvGr +
##     KitchenQual + TotRmsAbvGrd + Functional + Fireplaces + FireplaceQu +
##     GarageYrBlt + GarageFinish + GarageCars + GarageArea + GarageQual +
##     GarageCond + PavedDrive + WoodDeckSF + OpenPorchSF + EnclosedPorch +
##     X3SsnPorch + ScreenPorch + PoolArea + PoolQC + Fence + MiscVal +
##     MoSold + YrSold + SaleCondition
##
##          Df  Sum of Sq      RSS    AIC
## - PavedDrive      2 3.8156e+08 6.3099e+11 29435
## - LotShape         3 1.2810e+09 6.3189e+11 29435
## - HeatingQC        4 2.3073e+09 6.3292e+11 29436
## - BsmtFinType2     5 3.2548e+09 6.3387e+11 29436
## - Foundation       5 3.3205e+09 6.3393e+11 29436
## - CentralAir        1 3.8838e+05 6.3061e+11 29436
## - MiscVal          1 2.5099e+06 6.3062e+11 29436
## - LowQualFinSF     1 4.0706e+06 6.3062e+11 29436
## - OpenPorchSF       1 8.1050e+06 6.3062e+11 29436
## - BsmtHalfBath      1 2.3526e+07 6.3064e+11 29436
## - EnclosedPorch     1 2.7861e+07 6.3064e+11 29436
## - GarageYrBlt       1 3.3058e+07 6.3065e+11 29436
## - HouseStyle         7 5.3562e+09 6.3597e+11 29437
## - MSSubClass         1 1.7581e+08 6.3079e+11 29437
## - FireplaceQu        5 3.7583e+09 6.3437e+11 29437
## - BsmtFullBath       1 2.9651e+08 6.3091e+11 29437
## - HalfBath           1 2.9987e+08 6.3091e+11 29437
## - GarageFinish        2 1.2375e+09 6.3185e+11 29437
## - YrSold              1 5.4831e+08 6.3116e+11 29438
## - BsmtFinType1        5 4.1145e+09 6.3473e+11 29438
## - Utilities            1 7.2812e+08 6.3134e+11 29438
## - LotFrontage          1 8.5790e+08 6.3147e+11 29438
## <none>                  6.3061e+11 29438
## - X3SsnPorch          1 9.4115e+08 6.3155e+11 29438
## - MasVnrType            3 2.6863e+09 6.3330e+11 29438
## - FullBath              1 1.0700e+09 6.3168e+11 29439
## - MSZoning              4 3.7909e+09 6.3440e+11 29439
## - MoSold                1 1.2693e+09 6.3188e+11 29439
## - BldgType                4 3.8951e+09 6.3451e+11 29439
## - GarageCars              1 1.3815e+09 6.3199e+11 29440
## - BsmtCond                3 3.2975e+09 6.3391e+11 29440
## - RoofStyle                5 5.2184e+09 6.3583e+11 29440
## - Fence                   4 4.3953e+09 6.3501e+11 29440

```

```

## - YearRemodAdd    1 1.8797e+09 6.3249e+11 29441
## + Alley          2 1.8121e+08 6.3043e+11 29442
## - GarageArea     1 2.5692e+09 6.3318e+11 29442
## + GarageType     5 2.6131e+09 6.2800e+11 29442
## - TotRmsAbvGrd   1 2.6598e+09 6.3327e+11 29442
## + ExterCond      4 1.2579e+09 6.2935e+11 29443
## - WoodDeckSF     1 3.1158e+09 6.3373e+11 29444
## - GarageCond     4 5.8013e+09 6.3641e+11 29444
## + SaleType       8 4.4865e+09 6.2613e+11 29444
## - Exterior1st    14 1.4719e+10 6.4533e+11 29444
## + MiscFeature    4 9.4668e+08 6.2967e+11 29444
## + Electrical     4 7.7896e+08 6.2983e+11 29444
## + Heating         5 1.3760e+09 6.2924e+11 29445
## - Fireplaces     1 3.8173e+09 6.3443e+11 29445
## - ScreenPorch    1 3.8440e+09 6.3446e+11 29445
## - KitchenAbvGr   1 4.0364e+09 6.3465e+11 29446
## - LandContour    3 6.1027e+09 6.3672e+11 29446
## - BedroomAbvGr   1 4.6491e+09 6.3526e+11 29447
## - Street          1 4.7456e+09 6.3536e+11 29447
## - BsmtFinSF2     1 5.9694e+09 6.3658e+11 29450
## - LotConfig       4 8.8241e+09 6.3944e+11 29451
## - PoolArea        1 6.4407e+09 6.3705e+11 29451
## - GarageQual      4 1.0046e+10 6.4066e+11 29453
## - MasVnrArea      1 7.7060e+09 6.3832e+11 29454
## + Exterior2nd    14 3.9190e+09 6.2669e+11 29457
## - YearBuilt       1 9.3378e+09 6.3995e+11 29458
## - Functional      6 1.3832e+10 6.4444e+11 29458
## - LandSlope        2 1.0451e+10 6.4106e+11 29458
## - BsmtUnfSF       1 9.8001e+09 6.4041e+11 29459
## - ExterQual       3 1.2072e+10 6.4268e+11 29460
## - PoolQC          3 1.4267e+10 6.4488e+11 29465
## - Condition1      8 1.9527e+10 6.5014e+11 29467
## - SaleCondition    5 1.7432e+10 6.4804e+11 29468
## - BsmtQual         3 1.9116e+10 6.4973e+11 29476
## - LotArea          1 2.0604e+10 6.5122e+11 29483
## - KitchenQual      3 2.2897e+10 6.5351e+11 29484
## - BsmtExposure     3 2.5163e+10 6.5578e+11 29489
## - OverallCond      1 2.3969e+10 6.5458e+11 29491
## - OverallQual      1 2.3997e+10 6.5461e+11 29491
## - BsmtFinSF1       1 2.8442e+10 6.5905e+11 29501
## - X1stFlrSF        1 3.5773e+10 6.6639e+11 29517
## - X2ndFlrSF        1 7.4118e+10 7.0473e+11 29598
## - Condition2       7 8.2820e+10 7.1343e+11 29604
## - Neighborhood     24 1.0761e+11 7.3822e+11 29620
## - RoofMatl         7 1.0331e+11 7.3392e+11 29646
##
## Step: AIC=29435.18
## SalePrice ~ MSSubClass + MSZoning + LotFrontage + LotArea + Street +
##           LotShape + LandContour + Utilities + LotConfig + LandSlope +
##           Neighborhood + Condition1 + Condition2 + BldgType + HouseStyle +
##           OverallQual + OverallCond + YearBuilt + YearRemodAdd + RoofStyle +
##           RoofMatl + Exterior1st + MasVnrType + MasVnrArea + ExterQual +
##           Foundation + BsmtQual + BsmtCond + BsmtExposure + BsmtFinType1 +
##           BsmtFinSF1 + BsmtFinType2 + BsmtFinSF2 + BsmtUnfSF + HeatingQC +

```

```

## CentralAir + X1stFlrSF + X2ndFlrSF + LowQualFinSF + BsmtFullBath +
## BsmtHalfBath + FullBath + HalfBath + BedroomAbvGr + KitchenAbvGr +
## KitchenQual + TotRmsAbvGrd + Functional + Fireplaces + FireplaceQu +
## GarageYrBlt + GarageFinish + GarageCars + GarageArea + GarageQual +
## GarageCond + WoodDeckSF + OpenPorchSF + EnclosedPorch + X3SsnPorch +
## ScreenPorch + PoolArea + PoolQC + Fence + MiscVal + MoSold +
## YrSold + SaleCondition
##
##          Df  Sum of Sq      RSS     AIC
## - LotShape      3 1.2185e+09 6.3221e+11 29432
## - BsmtFinType2   5 3.2321e+09 6.3423e+11 29433
## - HeatingQC      4 2.4127e+09 6.3341e+11 29433
## - Foundation     5 3.3859e+09 6.3438e+11 29433
## - CentralAir     1 3.0390e+03 6.3099e+11 29433
## - MiscVal        1 2.6300e+06 6.3100e+11 29433
## - OpenPorchSF     1 7.5778e+06 6.3100e+11 29433
## - LowQualFinSF    1 1.4574e+07 6.3101e+11 29433
## - EnclosedPorch    1 2.6439e+07 6.3102e+11 29433
## - BsmtHalfBath    1 3.3615e+07 6.3103e+11 29433
## - GarageYrBlt     1 4.9497e+07 6.3104e+11 29433
## - HouseStyle       7 5.3766e+09 6.3637e+11 29434
## - MSSubClass       1 1.6975e+08 6.3116e+11 29434
## - FireplaceQu      5 3.7301e+09 6.3472e+11 29434
## - HalfBath         1 2.7046e+08 6.3126e+11 29434
## - BsmtFullBath     1 2.8653e+08 6.3128e+11 29434
## - GarageFinish      2 1.2437e+09 6.3224e+11 29434
## - YrSold           1 5.4285e+08 6.3154e+11 29434
## - BsmtFinType1      5 4.0461e+09 6.3504e+11 29434
## - Utilities         1 7.0923e+08 6.3170e+11 29435
## - LotFrontage       1 8.1096e+08 6.3181e+11 29435
## <none>                  6.3099e+11 29435
## - MasVnrType       3 2.6489e+09 6.3364e+11 29435
## - X3SsnPorch        1 9.7754e+08 6.3197e+11 29435
## - FullBath          1 1.0704e+09 6.3206e+11 29436
## - MSZoning          4 3.7519e+09 6.3475e+11 29436
## - MoSold            1 1.2728e+09 6.3227e+11 29436
## - BldgType          4 3.9776e+09 6.3497e+11 29436
## - BsmtCond          3 3.2469e+09 6.3424e+11 29437
## - GarageCars         1 1.5223e+09 6.3252e+11 29437
## - Fence              4 4.2960e+09 6.3529e+11 29437
## - RoofStyle          5 5.2737e+09 6.3627e+11 29437
## - YearRemodAdd       1 2.0327e+09 6.3303e+11 29438
## + PavedDrive         2 3.8156e+08 6.3061e+11 29438
## + Alley              2 1.2927e+08 6.3086e+11 29439
## - GarageArea          1 2.5282e+09 6.3352e+11 29439
## + GarageType          5 2.5566e+09 6.2844e+11 29439
## - TotRmsAbvGrd       1 2.7502e+09 6.3374e+11 29440
## + ExterCond          4 1.2842e+09 6.2971e+11 29440
## - WoodDeckSF          1 3.0901e+09 6.3408e+11 29440
## - GarageCond          4 5.7819e+09 6.3678e+11 29440
## + SaleType            8 4.5432e+09 6.2645e+11 29441
## - Exterior1st         14 1.4760e+10 6.4575e+11 29441
## + MiscFeature          4 9.5581e+08 6.3004e+11 29441
## + Electrical          4 7.8968e+08 6.3020e+11 29441

```

```

## + Heating          5 1.5004e+09 6.2949e+11 29442
## - Fireplaces      1 3.7623e+09 6.3476e+11 29442
## - ScreenPorch      1 3.8096e+09 6.3480e+11 29442
## - KitchenAbvGr    1 3.9687e+09 6.3496e+11 29442
## - LandContour      3 6.2421e+09 6.3724e+11 29444
## - BedroomAbvGr    1 4.7270e+09 6.3572e+11 29444
## - Street           1 4.7610e+09 6.3576e+11 29444
## - BsmtFinSF2       1 5.9750e+09 6.3697e+11 29447
## - LotConfig         4 8.8191e+09 6.3981e+11 29447
## - PoolArea          1 6.4441e+09 6.3744e+11 29448
## - GarageQual        4 9.9032e+09 6.4090e+11 29450
## - MasVnrArea        1 7.7768e+09 6.3877e+11 29451
## + Exterior2nd       14 3.9202e+09 6.2707e+11 29454
## - Functional        6 1.3746e+10 6.4474e+11 29455
## - LandSlope          2 1.0452e+10 6.4145e+11 29455
## - YearBuilt          1 9.7708e+09 6.4077e+11 29456
## - BsmtUnfSF          1 9.7761e+09 6.4077e+11 29456
## - ExterQual          3 1.2118e+10 6.4311e+11 29457
## - PoolQC             3 1.4270e+10 6.4526e+11 29462
## - Condition1          8 1.9557e+10 6.5055e+11 29464
## - SaleCondition       5 1.7412e+10 6.4841e+11 29465
## - BsmtQual            3 1.9161e+10 6.5016e+11 29473
## - LotArea              1 2.0566e+10 6.5156e+11 29480
## - KitchenQual          3 2.2934e+10 6.5393e+11 29481
## - BsmtExposure         3 2.5076e+10 6.5607e+11 29486
## - OverallCond          1 2.3695e+10 6.5469e+11 29487
## - OverallQual          1 2.4131e+10 6.5512e+11 29488
## - BsmtFinSF1            1 2.8506e+10 6.5950e+11 29498
## - X1stFlrSF             1 3.5599e+10 6.6659e+11 29513
## - X2ndFlrSF             1 7.4174e+10 7.0517e+11 29595
## - Condition2            7 8.2978e+10 7.1397e+11 29602
## - Neighborhood          24 1.0799e+11 7.3898e+11 29618
## - RoofMatl              7 1.0319e+11 7.3418e+11 29642
##
## Step: AIC=29432
## SalePrice ~ MSSubClass + MSZoning + LotFrontage + LotArea + Street +
##             LandContour + Utilities + LotConfig + LandSlope + Neighborhood +
##             Condition1 + Condition2 + BldgType + HouseStyle + OverallQual +
##             OverallCond + YearBuilt + YearRemodAdd + RoofStyle + RoofMatl +
##             Exterior1st + MasVnrType + MasVnrArea + ExterQual + Foundation +
##             BsmtQual + BsmtCond + BsmtExposure + BsmtFinType1 + BsmtFinSF1 +
##             BsmtFinType2 + BsmtFinSF2 + BsmtUnfSF + HeatingQC + CentralAir +
##             X1stFlrSF + X2ndFlrSF + LowQualFinSF + BsmtFullBath + BsmtHalfBath +
##             FullBath + HalfBath + BedroomAbvGr + KitchenAbvGr + KitchenQual +
##             TotRmsAbvGrd + Functional + Fireplaces + FireplaceQu + GarageYrBlt +
##             GarageFinish + GarageCars + GarageArea + GarageQual + GarageCond +
##             WoodDeckSF + OpenPorchSF + EnclosedPorch + X3SsnPorch + ScreenPorch +
##             PoolArea + PoolQC + Fence + MiscVal + MoSold + YrSold + SaleCondition
##
##                               Df  Sum of Sq      RSS     AIC
## - HeatingQC            4 2.3136e+09 6.3453e+11 29429
## - BsmtFinType2          5 3.3356e+09 6.3555e+11 29430
## - Foundation            5 3.3604e+09 6.3557e+11 29430
## - CentralAir             1 2.4568e+05 6.3221e+11 29430

```

```

## - MiscVal      1 4.8767e+05 6.3221e+11 29430
## - OpenPorchSF 1 6.1946e+06 6.3222e+11 29430
## - EnclosedPorch 1 1.4368e+07 6.3223e+11 29430
## - LowQualFinSF 1 1.6398e+07 6.3223e+11 29430
## - BsmtHalfBath 1 1.7670e+07 6.3223e+11 29430
## - GarageYrBlt  1 5.4581e+07 6.3227e+11 29430
## - HouseStyle   7 5.3694e+09 6.3758e+11 29430
## - MSSubClass   1 1.6636e+08 6.3238e+11 29430
## - FireplaceQu  5 3.6818e+09 6.3589e+11 29430
## - HalfBath     1 2.4573e+08 6.3246e+11 29431
## - BsmtFullBath 1 2.6684e+08 6.3248e+11 29431
## - GarageFinish 2 1.3039e+09 6.3352e+11 29431
## - BsmtFinType1 5 3.9717e+09 6.3618e+11 29431
## - YrSold       1 5.0346e+08 6.3272e+11 29431
## - Utilities    1 7.3834e+08 6.3295e+11 29432
## - LotFrontage  1 8.3315e+08 6.3305e+11 29432
## <none>          6.3221e+11 29432
## - MasVnrType   3 2.6244e+09 6.3484e+11 29432
## - X3SsnPorch   1 9.6401e+08 6.3318e+11 29432
## - FullBath     1 1.0612e+09 6.3327e+11 29432
## - MSZoning     4 3.6722e+09 6.3588e+11 29432
## - MoSold       1 1.2981e+09 6.3351e+11 29433
## - BldgType     4 3.9407e+09 6.3615e+11 29433
## - BsmtCond     3 3.1277e+09 6.3534e+11 29433
## - Fence         4 4.1749e+09 6.3639e+11 29434
## - GarageCars   1 1.5740e+09 6.3379e+11 29434
## - RoofStyle    5 5.2900e+09 6.3750e+11 29434
## + LotShape     3 1.2185e+09 6.3099e+11 29435
## - YearRemodAdd 1 2.2550e+09 6.3447e+11 29435
## + PavedDrive  2 3.1905e+08 6.3189e+11 29435
## + Alley        2 1.3181e+08 6.3208e+11 29436
## - GarageArea   1 2.4728e+09 6.3469e+11 29436
## - TotRmsAbvGrd 1 2.6252e+09 6.3484e+11 29436
## + GarageType   5 2.3962e+09 6.2982e+11 29436
## - WoodDeckSF  1 2.9131e+09 6.3513e+11 29437
## + ExterCond   4 1.3145e+09 6.3090e+11 29437
## + SaleType    8 4.5960e+09 6.2762e+11 29437
## + MiscFeature 4 8.8130e+08 6.3133e+11 29438
## - Exterior1st 14 1.4902e+10 6.4711e+11 29438
## + Electrical  4 7.2498e+08 6.3149e+11 29438
## + Heating      5 1.5071e+09 6.3071e+11 29438
## - GarageCond  4 6.3342e+09 6.3855e+11 29439
## - Fireplaces  1 3.7457e+09 6.3596e+11 29439
## - ScreenPorch  1 3.7749e+09 6.3599e+11 29439
## - KitchenAbvGr 1 4.0628e+09 6.3628e+11 29439
## - LandContour  3 6.1233e+09 6.3834e+11 29440
## - BedroomAbvGr 1 4.7620e+09 6.3697e+11 29441
## - Street       1 4.8504e+09 6.3706e+11 29441
## - BsmtFinSF2  1 5.8902e+09 6.3810e+11 29444
## - LotConfig    4 8.6547e+09 6.4087e+11 29444
## - PoolArea     1 6.3985e+09 6.3861e+11 29445
## - MasVnrArea   1 7.8068e+09 6.4002e+11 29448
## - GarageQual   4 1.0613e+10 6.4283e+11 29448
## + Exterior2nd 14 4.0010e+09 6.2821e+11 29451

```

```

## - YearBuilt      1 9.5934e+09 6.4181e+11 29452
## - BsmtUnfSF    1 9.6031e+09 6.4182e+11 29452
## - Functional     6 1.4018e+10 6.4623e+11 29452
## - LandSlope       2 1.0650e+10 6.4286e+11 29452
## - ExterQual      3 1.2829e+10 6.4504e+11 29455
## - PoolQC          3 1.4091e+10 6.4630e+11 29458
## - Condition1      8 1.9255e+10 6.5147e+11 29460
## - SaleCondition    5 1.7329e+10 6.4954e+11 29462
## - BsmtQual         3 1.9022e+10 6.5123e+11 29469
## - KitchenQual      3 2.2709e+10 6.5492e+11 29478
## - BsmtExposure     3 2.4741e+10 6.5695e+11 29482
## - OverallCond       1 2.3154e+10 6.5537e+11 29482
## - LotArea            1 2.3568e+10 6.5578e+11 29483
## - OverallQual       1 2.4455e+10 6.5667e+11 29485
## - BsmtFinSF1        1 2.8512e+10 6.6072e+11 29494
## - X1stFlrSF          1 3.5876e+10 6.6809e+11 29511
## - X2ndFlrSF          1 7.4704e+10 7.0692e+11 29593
## - Condition2          7 8.4627e+10 7.1684e+11 29601
## - Neighborhood       24 1.0742e+11 7.3964e+11 29613
## - RoofMatl            7 1.0371e+11 7.3592e+11 29640
##
## Step: AIC=29429.33
## SalePrice ~ MSSubClass + MSZoning + LotFrontage + LotArea + Street +
##           LandContour + Utilities + LotConfig + LandSlope + Neighborhood +
##           Condition1 + Condition2 + BldgType + HouseStyle + OverallQual +
##           OverallCond + YearBuilt + YearRemodAdd + RoofStyle + RoofMatl +
##           Exterior1st + MasVnrType + MasVnrArea + ExterQual + Foundation +
##           BsmtQual + BsmtCond + BsmtExposure + BsmtFinType1 + BsmtFinSF1 +
##           BsmtFinType2 + BsmtFinSF2 + BsmtUnfSF + CentralAir + X1stFlrSF +
##           X2ndFlrSF + LowQualFinSF + BsmtFullBath + BsmtHalfBath +
##           FullBath + HalfBath + BedroomAbvGr + KitchenAbvGr + KitchenQual +
##           TotRmsAbvGrd + Functional + Fireplaces + FireplaceQu + GarageYrBlt +
##           GarageFinish + GarageCars + GarageArea + GarageQual + GarageCond +
##           WoodDeckSF + OpenPorchSF + EnclosedPorch + X3SsnPorch + ScreenPorch +
##           PoolArea + PoolQC + Fence + MiscVal + MoSold + YrSold + SaleCondition
##
##               Df  Sum of Sq      RSS     AIC
## - Foundation      5 3.2807e+09 6.3781e+11 29427
## - CentralAir       1 1.0031e+05 6.3453e+11 29427
## - MiscVal          1 3.0954e+05 6.3453e+11 29427
## - EnclosedPorch    1 6.2649e+06 6.3453e+11 29427
## - LowQualFinSF     1 8.3727e+06 6.3453e+11 29427
## - OpenPorchSF      1 1.0028e+07 6.3454e+11 29427
## - BsmtHalfBath     1 1.5958e+07 6.3454e+11 29427
## - GarageYrBlt      1 3.6109e+07 6.3456e+11 29427
## - BsmtFinType2      5 3.5454e+09 6.3807e+11 29428
## - FireplaceQu       5 3.6073e+09 6.3813e+11 29428
## - MSSubClass        1 1.5705e+08 6.3468e+11 29428
## - HalfBath          1 1.8440e+08 6.3471e+11 29428
## - HouseStyle         7 5.4526e+09 6.3998e+11 29428
## - BsmtFullBath      1 3.5552e+08 6.3488e+11 29428
## - GarageFinish       2 1.2472e+09 6.3577e+11 29428
## - YrSold             1 4.2289e+08 6.3495e+11 29428
## - BsmtFinType1      5 3.9217e+09 6.3845e+11 29428

```

```

## - Utilities          1 8.2137e+08 6.3535e+11 29429
## <none>                  6.3453e+11 29429
## - LotFrontage        1 8.9235e+08 6.3542e+11 29429
## - FullBath           1 1.0564e+09 6.3558e+11 29430
## - X3SsnPorch         1 1.0734e+09 6.3560e+11 29430
## - MasVnrType          3 2.8235e+09 6.3735e+11 29430
## - MSZoning            4 3.8209e+09 6.3835e+11 29430
## - MoSold              1 1.3310e+09 6.3586e+11 29430
## - BldgType             4 4.0265e+09 6.3855e+11 29431
## - BsmtCond             3 3.1583e+09 6.3768e+11 29431
## - GarageCars           1 1.5550e+09 6.3608e+11 29431
## - Fence                 4 4.1833e+09 6.3871e+11 29431
## - RoofStyle             5 5.2323e+09 6.3976e+11 29431
## + HeatingQC             4 2.3136e+09 6.3221e+11 29432
## + PavedDrive            2 4.2808e+08 6.3410e+11 29432
## + LotShape              3 1.1194e+09 6.3341e+11 29433
## - GarageArea            1 2.3733e+09 6.3690e+11 29433
## + Alley                  2 1.6566e+08 6.3436e+11 29433
## - YearRemodAdd          1 2.4829e+09 6.3701e+11 29433
## - TotRmsAbvGrd          1 2.7267e+09 6.3725e+11 29434
## - WoodDeckSF             1 2.7411e+09 6.3727e+11 29434
## + GarageType             5 2.4065e+09 6.3212e+11 29434
## + ExterCond              4 1.3041e+09 6.3322e+11 29434
## + SaleType                8 4.4364e+09 6.3009e+11 29435
## + MiscFeature             4 8.4450e+08 6.3368e+11 29435
## - ScreenPorch             1 3.5141e+09 6.3804e+11 29435
## + Electrical              4 7.9110e+08 6.3374e+11 29436
## - GarageCond              4 6.2139e+09 6.4074e+11 29436
## + Heating                  5 1.4391e+09 6.3309e+11 29436
## - Fireplaces              1 4.0178e+09 6.3854e+11 29436
## - Exterior1st             14 1.5615e+10 6.5014e+11 29437
## - KitchenAbvGr            1 4.4339e+09 6.3896e+11 29438
## - LandContour              3 6.2216e+09 6.4075e+11 29438
## - Street                   1 4.9139e+09 6.3944e+11 29439
## - BedroomAbvGr            1 5.0994e+09 6.3963e+11 29439
## - BsmtFinSF2              1 5.7877e+09 6.4031e+11 29441
## - LotConfig                  4 8.6071e+09 6.4313e+11 29441
## - PoolArea                  1 6.5305e+09 6.4106e+11 29442
## - MasVnrArea                 1 7.9316e+09 6.4246e+11 29446
## - GarageQual                  4 1.0722e+10 6.4525e+11 29446
## + Exterior2nd               14 3.9553e+09 6.3057e+11 29448
## - Functional                 6 1.3900e+10 6.4843e+11 29449
## - BsmtUnfSF                  1 9.7977e+09 6.4432e+11 29450
## - LandSlope                   2 1.0719e+10 6.4524e+11 29450
## - YearBuilt                   1 1.0560e+10 6.4509e+11 29451
## - ExterQual                     3 1.2730e+10 6.4726e+11 29452
## - PoolQC                      3 1.3825e+10 6.4835e+11 29455
## - Condition1                   8 1.9329e+10 6.5386e+11 29457
## - SaleCondition                 5 1.7039e+10 6.5157e+11 29458
## - BsmtQual                      3 1.9458e+10 6.5398e+11 29467
## - KitchenQual                   3 2.2592e+10 6.5712e+11 29474
## - BsmtExposure                  3 2.4270e+10 6.5880e+11 29478
## - LotArea                        1 2.3589e+10 6.5812e+11 29481
## - OverallCond                   1 2.3912e+10 6.5844e+11 29481

```

```

## - OverallQual      1 2.4380e+10 6.5891e+11 29482
## - BsmtFinSF1      1 2.8352e+10 6.6288e+11 29491
## - X1stFlrSF        1 3.6112e+10 6.7064e+11 29508
## - X2ndFlrSF        1 7.6664e+10 7.1119e+11 29594
## - Condition2       7 8.4157e+10 7.1868e+11 29597
## - Neighborhood     24 1.0702e+11 7.4154e+11 29609
## - RoofMatl         7 1.0422e+11 7.3875e+11 29637
##
## Step: AIC=29426.86
## SalePrice ~ MSSubClass + MSZoning + LotFrontage + LotArea + Street +
##             LandContour + Utilities + LotConfig + LandSlope + Neighborhood +
##             Condition1 + Condition2 + BldgType + HouseStyle + OverallQual +
##             OverallCond + YearBuilt + YearRemodAdd + RoofStyle + RoofMatl +
##             Exterior1st + MasVnrType + MasVnrArea + ExterQual + BsmtQual +
##             BsmtCond + BsmtExposure + BsmtFinType1 + BsmtFinSF1 + BsmtFinType2 +
##             BsmtFinSF2 + BsmtUnfSF + CentralAir + X1stFlrSF + X2ndFlrSF +
##             LowQualFinSF + BsmtFullBath + BsmtHalfBath + FullBath + HalfBath +
##             BedroomAbvGr + KitchenAbvGr + KitchenQual + TotRmsAbvGrd +
##             Functional + Fireplaces + FireplaceQu + GarageYrBlt + GarageFinish +
##             GarageCars + GarageArea + GarageQual + GarageCond + WoodDeckSF +
##             OpenPorchSF + EnclosedPorch + X3SsnPorch + ScreenPorch +
##             PoolArea + PoolQC + Fence + MiscVal + MoSold + YrSold + SaleCondition
##
##              Df  Sum of Sq      RSS   AIC
## - HouseStyle      7 4.9542e+09 6.4276e+11 29424
## - MiscVal         1 8.8429e+04 6.3781e+11 29425
## - LowQualFinSF    1 8.8714e+05 6.3781e+11 29425
## - EnclosedPorch   1 3.1769e+06 6.3781e+11 29425
## - CentralAir      1 3.4692e+06 6.3781e+11 29425
## - BsmtHalfBath    1 1.7511e+07 6.3782e+11 29425
## - GarageYrBlt     1 2.0445e+07 6.3783e+11 29425
## - FireplaceQu     5 3.5350e+09 6.4134e+11 29425
## - OpenPorchSF     1 3.0857e+07 6.3784e+11 29425
## - BsmtFinType2    5 3.5396e+09 6.4135e+11 29425
## - HalfBath        1 1.8366e+08 6.3799e+11 29425
## - MSSubClass       1 2.2588e+08 6.3803e+11 29425
## - GarageFinish     2 1.1995e+09 6.3901e+11 29426
## - BsmtFullBath    1 3.9678e+08 6.3820e+11 29426
## - YrSold          1 4.0838e+08 6.3822e+11 29426
## - LotFrontage     1 5.7237e+08 6.3838e+11 29426
## - X3SsnPorch      1 7.0737e+08 6.3851e+11 29426
## - BsmtFinType1    5 4.3626e+09 6.4217e+11 29427
## - Utilities       1 8.5680e+08 6.3866e+11 29427
## <none>           6.3781e+11 29427
## - MasVnrType      3 2.6557e+09 6.4046e+11 29427
## - FullBath        1 1.0966e+09 6.3890e+11 29427
## - BsmtCond        3 2.9064e+09 6.4071e+11 29428
## - MSZoning        4 3.8949e+09 6.4170e+11 29428
## - MoSold          1 1.3893e+09 6.3920e+11 29428
## - BldgType         4 4.1269e+09 6.4193e+11 29428
## - GarageCars      1 1.6898e+09 6.3950e+11 29429
## - Fence           4 4.4705e+09 6.4228e+11 29429
## - RoofStyle        5 5.4047e+09 6.4321e+11 29429
## + Foundation      5 3.2807e+09 6.3453e+11 29429

```

```

## + PavedDrive      2 5.1248e+08 6.3729e+11 29430
## + HeatingQC       4 2.2339e+09 6.3557e+11 29430
## - GarageArea      1 2.1491e+09 6.3996e+11 29430
## + LotShape         3 1.1160e+09 6.3669e+11 29430
## - YearRemodAdd    1 2.4072e+09 6.4021e+11 29430
## + Alley            2 1.1661e+08 6.3769e+11 29431
## - WoodDeckSF       1 2.7357e+09 6.4054e+11 29431
## - TotRmsAbvGrd    1 2.8566e+09 6.4066e+11 29431
## + GarageType       5 2.3059e+09 6.3550e+11 29432
## + ExterCond        4 1.2272e+09 6.3658e+11 29432
## + SaleType          8 4.4150e+09 6.3339e+11 29433
## - GarageCond       4 6.1069e+09 6.4391e+11 29433
## + Electrical        4 8.7895e+08 6.3693e+11 29433
## - ScreenPorch       1 3.5141e+09 6.4132e+11 29433
## + MiscFeature       4 6.1553e+08 6.3719e+11 29434
## + Heating           5 1.3166e+09 6.3649e+11 29434
## - Fireplaces        1 4.0587e+09 6.4187e+11 29434
## - KitchenAbvGr     1 4.1626e+09 6.4197e+11 29434
## - Exterior1st       14 1.5740e+10 6.5355e+11 29434
## - LandContour       3 6.4344e+09 6.4424e+11 29436
## - Street             1 4.6815e+09 6.4249e+11 29436
## - BedroomAbvGr     1 4.9285e+09 6.4274e+11 29436
## - LotConfig          4 8.2972e+09 6.4610e+11 29438
## - BsmtFinSF2        1 5.9200e+09 6.4373e+11 29438
## - PoolArea           1 6.4705e+09 6.4428e+11 29440
## - MasVnrArea         1 7.8206e+09 6.4563e+11 29443
## - GarageQual         4 1.0535e+10 6.4834e+11 29443
## + Exterior2nd        14 3.8568e+09 6.3395e+11 29446
## - LandSlope          2 1.0430e+10 6.4824e+11 29446
## - Functional         6 1.4036e+10 6.5184e+11 29447
## - BsmtUnfSF          1 1.0501e+10 6.4831e+11 29449
## - ExterQual           3 1.2689e+10 6.5050e+11 29450
## - YearBuilt           1 1.1854e+10 6.4966e+11 29452
## - PoolQC              3 1.4181e+10 6.5199e+11 29453
## - Condition1          8 1.8850e+10 6.5666e+11 29453
## - SaleCondition        5 1.6905e+10 6.5471e+11 29455
## - BsmtQual             3 2.0324e+10 6.5813e+11 29467
## - KitchenQual          3 2.2481e+10 6.6029e+11 29471
## - BsmtExposure         3 2.4814e+10 6.6262e+11 29477
## - LotArea               1 2.3695e+10 6.6150e+11 29478
## - OverallCond          1 2.3781e+10 6.6159e+11 29478
## - OverallQual           1 2.3996e+10 6.6180e+11 29479
## - BsmtFinSF1            1 2.9062e+10 6.6687e+11 29490
## - X1stFlrSF              1 3.5801e+10 6.7361e+11 29505
## - X2ndFlrSF              1 7.5978e+10 7.1379e+11 29589
## - Condition2              7 8.3539e+10 7.2135e+11 29593
## - Neighborhood           24 1.0970e+11 7.4751e+11 29611
## - RoofMatl                7 1.0375e+11 7.4156e+11 29633
##
## Step: AIC=29424.16
## SalePrice ~ MSSubClass + MSZoning + LotFrontage + LotArea + Street +
##           LandContour + Utilities + LotConfig + LandSlope + Neighborhood +
##           Condition1 + Condition2 + BldgType + OverallQual + OverallCond +
##           YearBuilt + YearRemodAdd + RoofStyle + RoofMatl + Exterior1st +

```

```

##   MasVnrType + MasVnrArea + ExterQual + BsmtQual + BsmtCond +
##   BsmtExposure + BsmtFinType1 + BsmtFinSF1 + BsmtFinType2 +
##   BsmtFinSF2 + BsmtUnfSF + CentralAir + X1stFlrSF + X2ndFlrSF +
##   LowQualFinSF + BsmtFullBath + BsmtHalfBath + FullBath + HalfBath +
##   BedroomAbvGr + KitchenAbvGr + KitchenQual + TotRmsAbvGrd +
##   Functional + Fireplaces + FireplaceQu + GarageYrBlt + GarageFinish +
##   GarageCars + GarageArea + GarageQual + GarageCond + WoodDeckSF +
##   OpenPorchSF + EnclosedPorch + X3SsnPorch + ScreenPorch +
##   PoolArea + PoolQC + Fence + MiscVal + MoSold + YrSold + SaleCondition
##
##          Df  Sum of Sq      RSS     AIC
## - FireplaceQu    5 3.4165e+09 6.4618e+11 29422
## - MiscVal       1 2.0310e+06 6.4276e+11 29422
## - OpenPorchSF    1 6.4377e+06 6.4277e+11 29422
## - EnclosedPorch  1 7.3488e+06 6.4277e+11 29422
## - CentralAir     1 8.2680e+06 6.4277e+11 29422
## - BsmtHalfBath   1 9.5961e+06 6.4277e+11 29422
## - GarageYrBlt    1 3.2752e+07 6.4279e+11 29422
## - HalfBath        1 4.5849e+07 6.4281e+11 29422
## - BsmtFinType2    5 3.6369e+09 6.4640e+11 29422
## - LowQualFinSF   1 3.7611e+08 6.4314e+11 29423
## - YrSold         1 4.0114e+08 6.4316e+11 29423
## - BsmtFullBath   1 4.1581e+08 6.4318e+11 29423
## - GarageFinish    2 1.3264e+09 6.4409e+11 29423
## - LotFrontage     1 4.7187e+08 6.4323e+11 29423
## - BsmtFinType1    5 4.1058e+09 6.4687e+11 29424
## - X3SsnPorch     1 6.7661e+08 6.4344e+11 29424
## <none>           6.4276e+11 29424
## - BsmtCond        3 2.7098e+09 6.4547e+11 29424
## - MasVnrType       3 2.7113e+09 6.4547e+11 29424
## - Utilities        1 1.0204e+09 6.4378e+11 29424
## - Fence            4 3.7666e+09 6.4653e+11 29425
## - MSZoning         4 3.8387e+09 6.4660e+11 29425
## - MoSold           1 1.2475e+09 6.4401e+11 29425
## - FullBath          1 1.2746e+09 6.4404e+11 29425
## - GarageCars        1 1.8043e+09 6.4457e+11 29426
## - BldgType          4 4.4742e+09 6.4724e+11 29426
## - RoofStyle         5 5.4112e+09 6.4817e+11 29426
## - YearRemodAdd     1 1.9080e+09 6.4467e+11 29426
## - MSSubClass        1 1.9699e+09 6.4473e+11 29427
## + HeatingQC         4 2.3731e+09 6.4039e+11 29427
## + HouseStyle        7 4.9542e+09 6.3781e+11 29427
## + PavedDrive        2 5.5312e+08 6.4221e+11 29427
## - GarageArea         1 2.1829e+09 6.4494e+11 29427
## - TotRmsAbvGrd      1 2.3563e+09 6.4512e+11 29428
## + LotShape          3 1.1660e+09 6.4160e+11 29428
## + Foundation        5 2.7823e+09 6.3998e+11 29428
## + GarageType        5 2.7360e+09 6.4003e+11 29428
## + Alley              2 8.7269e+07 6.4267e+11 29428
## - WoodDeckSF         1 2.7139e+09 6.4548e+11 29428
## + SaleType           8 4.9779e+09 6.3778e+11 29429
## + Electrical         4 1.3206e+09 6.4144e+11 29429
## + ExterCond          4 1.0416e+09 6.4172e+11 29430
## - GarageCond         4 6.3153e+09 6.4908e+11 29430

```

```

## + MiscFeature      4 7.3370e+08 6.4203e+11 29430
## - ScreenPorch     1 3.7209e+09 6.4648e+11 29431
## - Fireplaces      1 3.8384e+09 6.4660e+11 29431
## + Heating          5 1.1455e+09 6.4162e+11 29432
## - KitchenAbvGr    1 4.4230e+09 6.4718e+11 29432
## - Exterior1st     14 1.6157e+10 6.5892e+11 29432
## - LandContour     3 6.3571e+09 6.4912e+11 29432
## - Street           1 4.7711e+09 6.4753e+11 29433
## - BedroomAbvGr    1 5.2800e+09 6.4804e+11 29434
## - LotConfig         4 8.0459e+09 6.5081e+11 29434
## - BsmtFinSF2       1 5.4593e+09 6.4822e+11 29434
## - PoolArea          1 6.4568e+09 6.4922e+11 29437
## - GarageQual        4 1.0554e+10 6.5331e+11 29440
## - MasVnrArea        1 8.3974e+09 6.5116e+11 29441
## + Exterior2nd      14 4.5140e+09 6.3825e+11 29442
## - BsmtUnfSF         1 9.3291e+09 6.5209e+11 29443
## - LandSlope          2 1.0289e+10 6.5305e+11 29443
## - Functional         6 1.4149e+10 6.5691e+11 29444
## - ExterQual          3 1.2675e+10 6.5544e+11 29447
## - Condition1         8 1.8438e+10 6.6120e+11 29449
## - SaleCondition      5 1.6807e+10 6.5957e+11 29452
## - YearBuilt          1 1.3311e+10 6.5607e+11 29452
## - PoolQC             3 1.5124e+10 6.5789e+11 29452
## - BsmtQual            3 2.1078e+10 6.6384e+11 29465
## - KitchenQual         3 2.3019e+10 6.6578e+11 29470
## - LotArea              1 2.3520e+10 6.6628e+11 29475
## - OverallQual         1 2.3650e+10 6.6641e+11 29475
## - BsmtExposure        3 2.5502e+10 6.6826e+11 29475
## - OverallCond         1 2.4581e+10 6.6734e+11 29477
## - BsmtFinSF1           1 2.7342e+10 6.7010e+11 29483
## - X1stFlrSF            1 4.3977e+10 6.8674e+11 29519
## - Condition2           7 8.2181e+10 7.2494e+11 29586
## - Neighborhood         24 1.1212e+11 7.5488e+11 29611
## - X2ndFlrSF            1 9.4074e+10 7.3684e+11 29622
## - RoofMatl              7 1.0537e+11 7.4814e+11 29632
##
## Step: AIC=29421.9
## SalePrice ~ MSSubClass + MSZoning + LotFrontage + LotArea + Street +
##           LandContour + Utilities + LotConfig + LandSlope + Neighborhood +
##           Condition1 + Condition2 + BldgType + OverallQual + OverallCond +
##           YearBuilt + YearRemodAdd + RoofStyle + RoofMatl + Exterior1st +
##           MasVnrType + MasVnrArea + ExterQual + BsmtQual + BsmtCond +
##           BsmtExposure + BsmtFinType1 + BsmtFinSF1 + BsmtFinType2 +
##           BsmtFinSF2 + BsmtUnfSF + CentralAir + X1stFlrSF + X2ndFlrSF +
##           LowQualFinSF + BsmtFullBath + BsmtHalfBath + FullBath + HalfBath +
##           BedroomAbvGr + KitchenAbvGr + KitchenQual + TotRmsAbvGrd +
##           Functional + Fireplaces + GarageYrBlt + GarageFinish + GarageCars +
##           GarageArea + GarageQual + GarageCond + WoodDeckSF + OpenPorchSF +
##           EnclosedPorch + X3SsnPorch + ScreenPorch + PoolArea + PoolQC +
##           Fence + MiscVal + MoSold + YrSold + SaleCondition
##
##                               Df  Sum of Sq      RSS      AIC
## - BsmtFinType2      5 3.5304e+09 6.4971e+11 29420
## - EnclosedPorch     1 1.3794e+05 6.4618e+11 29420

```

```

## - CentralAir      1 6.9468e+06 6.4618e+11 29420
## - MiscVal        1 1.1805e+07 6.4619e+11 29420
## - OpenPorchSF    1 1.2295e+07 6.4619e+11 29420
## - GarageYrBlt   1 2.5065e+07 6.4620e+11 29420
## - HalfBath       1 3.9882e+07 6.4622e+11 29420
## - BsmtHalfBath  1 4.2622e+07 6.4622e+11 29420
## - YrSold         1 2.9926e+08 6.4648e+11 29421
## - BsmtFullBath  1 3.8827e+08 6.4657e+11 29421
## - LotFrontage    1 4.3698e+08 6.4661e+11 29421
## - LowQualFinSF  1 4.6899e+08 6.4665e+11 29421
## - BsmtFinType1  5 4.0661e+09 6.5024e+11 29421
## - GarageFinish   2 1.4773e+09 6.4766e+11 29421
## - X3SsnPorch    1 6.3219e+08 6.4681e+11 29421
## - BsmtCond      3 2.5888e+09 6.4877e+11 29422
## <none>           6.4618e+11 29422
## - Utilities     1 1.0682e+09 6.4725e+11 29422
## - MasVnrType    3 2.8850e+09 6.4906e+11 29422
## - MoSold        1 1.2052e+09 6.4738e+11 29423
## - FullBath      1 1.2055e+09 6.4738e+11 29423
## - Fence          4 3.9640e+09 6.5014e+11 29423
## - MSZoning      4 4.0034e+09 6.5018e+11 29423
## - RoofStyle     5 5.0728e+09 6.5125e+11 29423
## - BldgType       4 4.2283e+09 6.5041e+11 29423
## - YearRemodAdd  1 1.8816e+09 6.4806e+11 29424
## + FireplaceQu  5 3.4165e+09 6.4276e+11 29424
## - GarageCars    1 1.9138e+09 6.4809e+11 29424
## - Fireplaces    1 2.0181e+09 6.4820e+11 29424
## - GarageArea    1 2.0403e+09 6.4822e+11 29424
## - MSSubClass    1 2.1321e+09 6.4831e+11 29425
## + HeatingQC     4 2.2893e+09 6.4389e+11 29425
## + PavedDrive   2 5.0146e+08 6.4568e+11 29425
## + HouseStyle   7 4.8357e+09 6.4134e+11 29425
## - TotRmsAbvGrd 1 2.3816e+09 6.4856e+11 29425
## - WoodDeckSF   1 2.4030e+09 6.4858e+11 29425
## + LotShape      3 1.1146e+09 6.4506e+11 29425
## + Alley          2 9.6495e+07 6.4608e+11 29426
## + Foundation    5 2.7406e+09 6.4344e+11 29426
## + GarageType    5 2.6225e+09 6.4356e+11 29426
## + SaleType      8 5.1400e+09 6.4104e+11 29426
## + Electrical    4 1.3852e+09 6.4479e+11 29427
## + ExterCond     4 9.3298e+08 6.4524e+11 29428
## + MiscFeature   4 9.0896e+08 6.4527e+11 29428
## - ScreenPorch   1 3.7002e+09 6.4988e+11 29428
## + Heating        5 1.1979e+09 6.4498e+11 29429
## - GarageCond    4 6.8986e+09 6.5308e+11 29429
## - KitchenAbvGr 1 4.2964e+09 6.5047e+11 29430
## - Street         1 4.6275e+09 6.5081e+11 29430
## - Exterior1st  14 1.6538e+10 6.6272e+11 29431
## - LandContour   3 6.8937e+09 6.5307e+11 29431
## - BsmtFinSF2   1 5.1171e+09 6.5129e+11 29431
## - LotConfig     4 7.8707e+09 6.5405e+11 29432
## - BedroomAbvGr 1 5.2064e+09 6.5138e+11 29432
## - PoolArea      1 5.6198e+09 6.5180e+11 29432
## - MasVnrArea    1 7.9941e+09 6.5417e+11 29438

```

```

## - GarageQual      4 1.1086e+10 6.5726e+11 29439
## + Exterior2nd    14 4.7558e+09 6.4142e+11 29439
## - LandSlope       2 9.7808e+09 6.5596e+11 29440
## - Functional      6 1.3603e+10 6.5978e+11 29440
## - BsmtUnfSF       1 9.2776e+09 6.5546e+11 29441
## - ExterQual        3 1.2996e+10 6.5917e+11 29445
## - Condition1       8 1.8509e+10 6.6469e+11 29447
## - PoolQC          3 1.4738e+10 6.6092e+11 29449
## - YearBuilt        1 1.3074e+10 6.5925e+11 29449
## - SaleCondition    5 1.6953e+10 6.6313e+11 29450
## - BsmtQual         3 2.1121e+10 6.6730e+11 29463
## - KitchenQual      3 2.3992e+10 6.7017e+11 29469
## - OverallQual      1 2.3116e+10 6.6929e+11 29471
## - LotArea           1 2.4462e+10 6.7064e+11 29474
## - OverallCond       1 2.4645e+10 6.7082e+11 29474
## - BsmtExposure     3 2.6817e+10 6.7300e+11 29475
## - BsmtFinSF1        1 2.7822e+10 6.7400e+11 29481
## - X1stFlrSF         1 4.4460e+10 6.9064e+11 29517
## - Condition2        7 8.2507e+10 7.2868e+11 29583
## - Neighborhood      24 1.1107e+11 7.5725e+11 29606
## - X2ndFlrSF         1 9.5753e+10 7.4193e+11 29622
## - RoofMatl          7 1.0911e+11 7.5528e+11 29636
##
## Step: AIC=29419.85
## SalePrice ~ MSSubClass + MSZoning + LotFrontage + LotArea + Street +
##             LandContour + Utilities + LotConfig + LandSlope + Neighborhood +
##             Condition1 + Condition2 + BldgType + OverallQual + OverallCond +
##             YearBuilt + YearRemodAdd + RoofStyle + RoofMatl + Exterior1st +
##             MasVnrType + MasVnrArea + ExterQual + BsmtQual + BsmtCond +
##             BsmtExposure + BsmtFinType1 + BsmtFinSF1 + BsmtFinSF2 + BsmtUnfSF +
##             CentralAir + X1stFlrSF + X2ndFlrSF + LowQualFinSF + BsmtFullBath +
##             BsmtHalfBath + FullBath + HalfBath + BedroomAbvGr + KitchenAbvGr +
##             KitchenQual + TotRmsAbvGrd + Functional + Fireplaces + GarageYrBlt +
##             GarageFinish + GarageCars + GarageArea + GarageQual + GarageCond +
##             WoodDeckSF + OpenPorchSF + EnclosedPorch + X3SsnPorch + ScreenPorch +
##             PoolArea + PoolQC + Fence + MiscVal + MoSold + YrSold + SaleCondition
##
##                               Df  Sum of Sq      RSS   AIC
## - EnclosedPorch    1 2.7907e+06 6.4971e+11 29418
## - CentralAir       1 3.2857e+06 6.4971e+11 29418
## - OpenPorchSF      1 8.7472e+06 6.4972e+11 29418
## - BsmtHalfBath     1 9.1542e+06 6.4972e+11 29418
## - MiscVal          1 1.0661e+07 6.4972e+11 29418
## - GarageYrBlt      1 2.1105e+07 6.4973e+11 29418
## - HalfBath          1 5.2374e+07 6.4976e+11 29418
## - BsmtFinType1     5 3.6642e+09 6.5337e+11 29418
## - YrSold            1 2.7409e+08 6.4998e+11 29418
## - LotFrontage       1 3.9744e+08 6.5011e+11 29419
## - LowQualFinSF     1 4.4673e+08 6.5015e+11 29419
## - BsmtFullBath     1 5.8527e+08 6.5029e+11 29419
## - X3SsnPorch        1 5.9204e+08 6.5030e+11 29419
## - GarageFinish      2 1.5094e+09 6.5122e+11 29419
## - BsmtCond          3 2.4873e+09 6.5220e+11 29419
## <none>                      6.4971e+11 29420

```

```

## - Utilities          1 1.0378e+09 6.5075e+11 29420
## - MasVnrType        3 2.8592e+09 6.5257e+11 29420
## - Fence              4 3.8633e+09 6.5357e+11 29420
## - MoSold             1 1.1938e+09 6.5090e+11 29420
## - FullBath           1 1.2813e+09 6.5099e+11 29421
## - RoofStyle          5 4.8643e+09 6.5457e+11 29421
## - MSZoning           4 4.1165e+09 6.5382e+11 29421
## - BldgType            4 4.3465e+09 6.5405e+11 29422
## + BsmtFinType2       5 3.5304e+09 6.4618e+11 29422
## + HeatingQC          4 2.4998e+09 6.4721e+11 29422
## - MSSubClass          1 1.9692e+09 6.5168e+11 29422
## - YearRemodAdd        1 1.9941e+09 6.5170e+11 29422
## - GarageArea          1 2.0087e+09 6.5172e+11 29422
## + FireplaceQu         5 3.3099e+09 6.4640e+11 29422
## - WoodDeckSF          1 2.0714e+09 6.5178e+11 29422
## - GarageCars           1 2.0766e+09 6.5178e+11 29422
## + HouseStyle          7 4.9098e+09 6.4480e+11 29423
## - Fireplaces           1 2.2105e+09 6.5192e+11 29423
## + PavedDrive          2 4.5791e+08 6.4925e+11 29423
## + LotShape             3 1.1841e+09 6.4852e+11 29423
## + SaleType             8 5.5290e+09 6.4418e+11 29423
## + Foundation           5 2.7837e+09 6.4692e+11 29424
## - TotRmsAbvGrd        1 2.6123e+09 6.5232e+11 29424
## + Alley                 2 6.1496e+07 6.4965e+11 29424
## + GarageType           5 2.5360e+09 6.4717e+11 29424
## + Electrical            4 1.2834e+09 6.4842e+11 29425
## + ExterCond             4 9.6951e+08 6.4874e+11 29426
## - ScreenPorch           1 3.5553e+09 6.5326e+11 29426
## + MiscFeature           4 8.4792e+08 6.4886e+11 29426
## + Heating                5 1.2458e+09 6.4846e+11 29427
## - GarageCond            4 6.8789e+09 6.5659e+11 29427
## - KitchenAbvGr          1 4.2575e+09 6.5397e+11 29427
## - Street                  1 4.5756e+09 6.5428e+11 29428
## - LandContour            3 6.6045e+09 6.5631e+11 29429
## - Exterior1st           14 1.6859e+10 6.6657e+11 29429
## - LotConfig               4 7.8115e+09 6.5752e+11 29429
## - PoolArea                 1 5.6655e+09 6.5537e+11 29430
## - BedroomAbvGr           1 5.8317e+09 6.5554e+11 29431
## - MasVnrArea              1 7.8621e+09 6.5757e+11 29435
## - GarageQual              4 1.0950e+10 6.6066e+11 29436
## - LandSlope                 2 9.3588e+09 6.5907e+11 29437
## + Exterior2nd            14 4.4062e+09 6.4530e+11 29438
## - Functional                6 1.3901e+10 6.6361e+11 29439
## - BsmtUnfSF                1 9.9598e+09 6.5967e+11 29440
## - BsmtFinSF2               1 1.1097e+10 6.6080e+11 29443
## - ExterQual                  3 1.3276e+10 6.6298e+11 29443
## - Condition1                 8 1.8407e+10 6.6812e+11 29445
## - SaleCondition              5 1.6335e+10 6.6604e+11 29446
## - PoolQC                     3 1.5309e+10 6.6502e+11 29448
## - YearBuilt                   1 1.3798e+10 6.6351e+11 29448
## - BsmtQual                    3 2.1805e+10 6.7151e+11 29462
## - KitchenQual                  3 2.3499e+10 6.7321e+11 29466
## - OverallQual                  1 2.2844e+10 6.7255e+11 29468
## - LotArea                      1 2.4115e+10 6.7382e+11 29471

```

```

## - OverallCond      1 2.5682e+10 6.7539e+11 29474
## - BsmtExposure    3 2.9263e+10 6.7897e+11 29478
## - BsmtFinSF1       1 2.7884e+10 6.7759e+11 29479
## - X1stFlrSF        1 4.3667e+10 6.9338e+11 29513
## - Condition2       7 8.3031e+10 7.3274e+11 29581
## - Neighborhood     24 1.1307e+11 7.6278e+11 29606
## - X2ndFlrSF        1 9.5389e+10 7.4510e+11 29618
## - RoofMatl         7 1.0885e+11 7.5856e+11 29632
##
## Step: AIC=29417.86
## SalePrice ~ MSSubClass + MSZoning + LotFrontage + LotArea + Street +
##             LandContour + Utilities + LotConfig + LandSlope + Neighborhood +
##             Condition1 + Condition2 + BldgType + OverallQual + OverallCond +
##             YearBuilt + YearRemodAdd + RoofStyle + RoofMatl + Exterior1st +
##             MasVnrType + MasVnrArea + ExterQual + BsmtQual + BsmtCond +
##             BsmtExposure + BsmtFinType1 + BsmtFinSF1 + BsmtFinSF2 + BsmtUnfSF +
##             CentralAir + X1stFlrSF + X2ndFlrSF + LowQualFinSF + BsmtFullBath +
##             BsmtHalfBath + FullBath + HalfBath + BedroomAbvGr + KitchenAbvGr +
##             KitchenQual + TotRmsAbvGrd + Functional + Fireplaces + GarageYrBlt +
##             GarageFinish + GarageCars + GarageArea + GarageQual + GarageCond +
##             WoodDeckSF + OpenPorchSF + X3SsnPorch + ScreenPorch + PoolArea +
##             PoolQC + Fence + MiscVal + MoSold + YrSold + SaleCondition
##
##              Df  Sum of Sq      RSS   AIC
## - CentralAir      1 3.5269e+06 6.4971e+11 29416
## - OpenPorchSF     1 8.1934e+06 6.4972e+11 29416
## - BsmtHalfBath    1 8.8933e+06 6.4972e+11 29416
## - MiscVal         1 1.0620e+07 6.4972e+11 29416
## - GarageYrBlt    1 2.1097e+07 6.4973e+11 29416
## - HalfBath        1 5.2887e+07 6.4976e+11 29416
## - BsmtFinType1    5 3.6628e+09 6.5337e+11 29416
## - YrSold          1 2.7461e+08 6.4999e+11 29416
## - LotFrontage     1 4.0069e+08 6.5011e+11 29417
## - LowQualFinSF    1 4.5503e+08 6.5017e+11 29417
## - X3SsnPorch      1 5.8983e+08 6.5030e+11 29417
## - BsmtFullBath    1 5.9315e+08 6.5030e+11 29417
## - GarageFinish    2 1.5066e+09 6.5122e+11 29417
## - BsmtCond        3 2.4867e+09 6.5220e+11 29417
## <none>            6.4971e+11 29418
## - Utilities       1 1.0380e+09 6.5075e+11 29418
## - MasVnrType      3 2.8586e+09 6.5257e+11 29418
## - Fence           4 3.8605e+09 6.5357e+11 29418
## - MoSold          1 1.2001e+09 6.5091e+11 29419
## - FullBath        1 1.2852e+09 6.5100e+11 29419
## - RoofStyle       5 4.8646e+09 6.5458e+11 29419
## - MSZoning        4 4.1138e+09 6.5382e+11 29419
## - BldgType         4 4.3622e+09 6.5407e+11 29420
## + EnclosedPorch   1 2.7907e+06 6.4971e+11 29420
## + BsmtFinType2    5 3.5330e+09 6.4618e+11 29420
## + HeatingQC       4 2.5003e+09 6.4721e+11 29420
## - MSSubClass      1 1.9666e+09 6.5168e+11 29420
## - YearRemodAdd   1 1.9965e+09 6.5171e+11 29420
## - GarageArea      1 2.0155e+09 6.5173e+11 29420
## + FireplaceQu    5 3.2994e+09 6.4641e+11 29420

```

```

## - WoodDeckSF      1 2.0701e+09 6.5178e+11 29420
## - GarageCars     1 2.0739e+09 6.5178e+11 29420
## + HouseStyle      7 4.9119e+09 6.4480e+11 29421
## - Fireplaces      1 2.2112e+09 6.5192e+11 29421
## + PavedDrive      2 4.5764e+08 6.4925e+11 29421
## + LotShape         3 1.1793e+09 6.4853e+11 29421
## + SaleType         8 5.5243e+09 6.4419e+11 29421
## + Foundation       5 2.7837e+09 6.4693e+11 29422
## - TotRmsAbvGrd    1 2.6102e+09 6.5232e+11 29422
## + Alley            2 6.0775e+07 6.4965e+11 29422
## + GarageType       5 2.5382e+09 6.4717e+11 29422
## + Electrical       4 1.2861e+09 6.4842e+11 29423
## + ExterCond        4 9.6973e+08 6.4874e+11 29424
## - ScreenPorch      1 3.5817e+09 6.5329e+11 29424
## + MiscFeature      4 8.5038e+08 6.4886e+11 29424
## + Heating           5 1.2469e+09 6.4846e+11 29425
## - GarageCond       4 6.8892e+09 6.5660e+11 29425
## - KitchenAbvGr     1 4.2552e+09 6.5397e+11 29425
## - Street            1 4.5906e+09 6.5430e+11 29426
## - LandContour      3 6.6037e+09 6.5631e+11 29427
## - Exterior1st      14 1.6881e+10 6.6659e+11 29427
## - LotConfig          4 7.8259e+09 6.5754e+11 29427
## - PoolArea          1 5.6639e+09 6.5537e+11 29428
## - BedroomAbvGr     1 5.8307e+09 6.5554e+11 29429
## - MasVnrArea        1 7.8599e+09 6.5757e+11 29433
## - GarageQual        4 1.0960e+10 6.6067e+11 29434
## - LandSlope          2 9.3565e+09 6.5907e+11 29435
## + Exterior2nd      14 4.4031e+09 6.4531e+11 29436
## - Functional        6 1.3899e+10 6.6361e+11 29437
## - BsmtUnfSF         1 9.9876e+09 6.5970e+11 29438
## - BsmtFinSF2        1 1.1123e+10 6.6083e+11 29441
## - ExterQual          3 1.3293e+10 6.6300e+11 29441
## - Condition1         8 1.8404e+10 6.6812e+11 29443
## - SaleCondition      5 1.6339e+10 6.6605e+11 29444
## - PoolQC             3 1.5404e+10 6.6511e+11 29446
## - YearBuilt          1 1.4300e+10 6.6401e+11 29448
## - BsmtQual           3 2.1804e+10 6.7152e+11 29460
## - KitchenQual        3 2.3499e+10 6.7321e+11 29464
## - OverallQual        1 2.2990e+10 6.7270e+11 29467
## - LotArea             1 2.4128e+10 6.7384e+11 29469
## - OverallCond        1 2.5964e+10 6.7568e+11 29473
## - BsmtExposure       3 2.9300e+10 6.7901e+11 29476
## - BsmtFinSF1          1 2.7892e+10 6.7760e+11 29477
## - X1stFlrSF           1 4.3676e+10 6.9339e+11 29511
## - Condition2          7 8.3028e+10 7.3274e+11 29579
## - Neighborhood        24 1.1317e+11 7.6288e+11 29604
## - X2ndFlrSF           1 9.5398e+10 7.4511e+11 29616
## - RoofMatl             7 1.0887e+11 7.5859e+11 29630
##
## Step: AIC=29415.87
## SalePrice ~ MSSubClass + MSZoning + LotFrontage + LotArea + Street +
##           LandContour + Utilities + LotConfig + LandSlope + Neighborhood +
##           Condition1 + Condition2 + BldgType + OverallQual + OverallCond +
##           YearBuilt + YearRemodAdd + RoofStyle + RoofMatl + Exterior1st +

```

```

##   MasVnrType + MasVnrArea + ExterQual + BsmtQual + BsmtCond +
##   BsmtExposure + BsmtFinType1 + BsmtFinSF1 + BsmtFinSF2 + BsmtUnfSF +
##   X1stFlrSF + X2ndFlrSF + LowQualFinSF + BsmtFullBath + BsmtHalfBath +
##   FullBath + HalfBath + BedroomAbvGr + KitchenAbvGr + KitchenQual +
##   TotRmsAbvGrd + Functional + Fireplaces + GarageYrBlt + GarageFinish +
##   GarageCars + GarageArea + GarageQual + GarageCond + WoodDeckSF +
##   OpenPorchSF + X3SsnPorch + ScreenPorch + PoolArea + PoolQC +
##   Fence + MiscVal + MoSold + YrSold + SaleCondition
##
##              Df  Sum of Sq      RSS     AIC
## - OpenPorchSF  1 7.3621e+06 6.4972e+11 29414
## - BsmtHalfBath 1 8.9529e+06 6.4972e+11 29414
## - MiscVal      1 1.0465e+07 6.4972e+11 29414
## - GarageYrBlt  1 1.9612e+07 6.4973e+11 29414
## - HalfBath      1 5.2313e+07 6.4977e+11 29414
## - BsmtFinType1  5 3.6600e+09 6.5337e+11 29414
## - YrSold        1 2.7670e+08 6.4999e+11 29414
## - LotFrontage    1 4.0185e+08 6.5012e+11 29415
## - LowQualFinSF  1 4.5206e+08 6.5017e+11 29415
## - X3SsnPorch    1 5.9064e+08 6.5031e+11 29415
## - BsmtFullBath   1 5.9485e+08 6.5031e+11 29415
## - GarageFinish    2 1.5038e+09 6.5122e+11 29415
## - BsmtCond       3 2.5108e+09 6.5223e+11 29416
## <none>           6.4971e+11 29416
## - Utilities      1 1.0378e+09 6.5075e+11 29416
## - MasVnrType     3 2.8577e+09 6.5257e+11 29416
## - Fence          4 3.8579e+09 6.5357e+11 29416
## - MoSold         1 1.2010e+09 6.5092e+11 29417
## - FullBath        1 1.2821e+09 6.5100e+11 29417
## - RoofStyle       5 4.8630e+09 6.5458e+11 29417
## - MSZoning        4 4.1572e+09 6.5387e+11 29417
## - BldgType        4 4.3767e+09 6.5409e+11 29418
## + CentralAir      1 3.5269e+06 6.4971e+11 29418
## + EnclosedPorch   1 3.0318e+06 6.4971e+11 29418
## + BsmtFinType2    5 3.5295e+09 6.4618e+11 29418
## + HeatingQC       4 2.4981e+09 6.4722e+11 29418
## - MSSubClass      1 1.9683e+09 6.5168e+11 29418
## - YearRemodAdd    1 2.0109e+09 6.5173e+11 29418
## - GarageArea      1 2.0155e+09 6.5173e+11 29418
## + FireplaceQu    5 3.2979e+09 6.4642e+11 29418
## - GarageCars      1 2.0705e+09 6.5178e+11 29418
## - WoodDeckSF      1 2.0719e+09 6.5179e+11 29418
## + HouseStyle      7 4.9143e+09 6.4480e+11 29419
## + PavedDrive      2 4.5811e+08 6.4926e+11 29419
## - Fireplaces      1 2.2546e+09 6.5197e+11 29419
## + LotShape         3 1.1788e+09 6.4854e+11 29419
## + SaleType         8 5.5167e+09 6.4420e+11 29419
## + Foundation      5 2.7867e+09 6.4693e+11 29420
## - TotRmsAbvGrd    1 2.6133e+09 6.5233e+11 29420
## + Alley            2 6.0375e+07 6.4965e+11 29420
## + GarageType      5 2.5413e+09 6.4717e+11 29420
## + Electrical      4 1.2153e+09 6.4850e+11 29421
## + ExterCond        4 9.7258e+08 6.4874e+11 29422
## - ScreenPorch     1 3.5966e+09 6.5331e+11 29422

```

```

## + MiscFeature      4 8.5136e+08 6.4886e+11 29422
## + Heating          5 1.2479e+09 6.4847e+11 29423
## - GarageCond       4 6.8860e+09 6.5660e+11 29423
## - KitchenAbvGr    1 4.2629e+09 6.5398e+11 29423
## - Street           1 4.5899e+09 6.5430e+11 29424
## - LandContour      3 6.6082e+09 6.5632e+11 29425
## - Exterior1st      14 1.6893e+10 6.6661e+11 29425
## - LotConfig         4 7.8319e+09 6.5755e+11 29425
## - PoolArea          1 5.6680e+09 6.5538e+11 29426
## - BedroomAbvGr     1 5.8327e+09 6.5555e+11 29427
## - MasVnrArea        1 7.8584e+09 6.5757e+11 29431
## - GarageQual        4 1.0958e+10 6.6067e+11 29432
## - LandSlope          2 9.3741e+09 6.5909e+11 29433
## + Exterior2nd       14 4.3985e+09 6.4532e+11 29434
## - Functional        6 1.3903e+10 6.6362e+11 29435
## - BsmtUnfSF         1 9.9879e+09 6.5970e+11 29436
## - BsmtFinSF2        1 1.1124e+10 6.6084e+11 29439
## - ExterQual          3 1.3291e+10 6.6301e+11 29439
## - Condition1         8 1.8426e+10 6.6814e+11 29441
## - SaleCondition      5 1.6336e+10 6.6605e+11 29442
## - PoolQC             3 1.5434e+10 6.6515e+11 29444
## - YearBuilt          1 1.4635e+10 6.6435e+11 29446
## - BsmtQual            3 2.1818e+10 6.7153e+11 29458
## - KitchenQual         3 2.3499e+10 6.7321e+11 29462
## - OverallQual         1 2.3032e+10 6.7275e+11 29465
## - LotArea              1 2.4173e+10 6.7389e+11 29467
## - OverallCond         1 2.6839e+10 6.7655e+11 29473
## - BsmtExposure        3 2.9299e+10 6.7901e+11 29474
## - BsmtFinSF1           1 2.7894e+10 6.7761e+11 29475
## - X1stFlrSF            1 4.3835e+10 6.9355e+11 29509
## - Condition2            7 8.3038e+10 7.3275e+11 29578
## - Neighborhood          24 1.1317e+11 7.6289e+11 29602
## - X2ndFlrSF             1 9.5424e+10 7.4514e+11 29614
## - RoofMatl              7 1.0887e+11 7.5859e+11 29628
##
## Step: AIC=29413.88
## SalePrice ~ MSSubClass + MSZoning + LotFrontage + LotArea + Street +
##           LandContour + Utilities + LotConfig + LandSlope + Neighborhood +
##           Condition1 + Condition2 + BldgType + OverallQual + OverallCond +
##           YearBuilt + YearRemodAdd + RoofStyle + RoofMatl + Exterior1st +
##           MasVnrType + MasVnrArea + ExterQual + BsmtQual + BsmtCond +
##           BsmtExposure + BsmtFinType1 + BsmtFinSF1 + BsmtFinSF2 + BsmtUnfSF +
##           X1stFlrSF + X2ndFlrSF + LowQualFinSF + BsmtFullBath + BsmtHalfBath +
##           FullBath + HalfBath + BedroomAbvGr + KitchenAbvGr + KitchenQual +
##           TotRmsAbvGrd + Functional + Fireplaces + GarageYrBlt + GarageFinish +
##           GarageCars + GarageArea + GarageQual + GarageCond + WoodDeckSF +
##           X3SsnPorch + ScreenPorch + PoolArea + PoolQC + Fence + MiscVal +
##           MoSold + YrSold + SaleCondition
##
##                               Df  Sum of Sq      RSS      AIC
## - BsmtHalfBath      1 8.7675e+06 6.4973e+11 29412
## - MiscVal            1 1.0482e+07 6.4973e+11 29412
## - GarageYrBlt       1 2.0884e+07 6.4974e+11 29412
## - HalfBath           1 5.6735e+07 6.4978e+11 29412

```

```

## - BsmtFinType1      5 3.6754e+09 6.5340e+11 29412
## - YrSold           1 2.8449e+08 6.5001e+11 29412
## - LotFrontage       1 4.0300e+08 6.5012e+11 29413
## - LowQualFinSF     1 4.5246e+08 6.5017e+11 29413
## - X3SsnPorch        1 5.8635e+08 6.5031e+11 29413
## - BsmtFullBath      1 6.0402e+08 6.5033e+11 29413
## - GarageFinish       2 1.4995e+09 6.5122e+11 29413
## - BsmtCond          3 2.5129e+09 6.5223e+11 29414
## <none>              6.4972e+11 29414
## - Utilities          1 1.0311e+09 6.5075e+11 29414
## - MasVnrType         3 2.8516e+09 6.5257e+11 29414
## - Fence              4 3.8524e+09 6.5357e+11 29414
## - MoSold             1 1.1938e+09 6.5092e+11 29415
## - RoofStyle          5 4.8559e+09 6.5458e+11 29415
## - FullBath           1 1.2889e+09 6.5101e+11 29415
## - MSZoning           4 4.1512e+09 6.5387e+11 29415
## - BldgType            4 4.3726e+09 6.5409e+11 29416
## + OpenPorchSF        1 7.3621e+06 6.4971e+11 29416
## + CentralAir          1 2.6956e+06 6.4972e+11 29416
## + EnclosedPorch       1 2.4509e+06 6.4972e+11 29416
## + BsmtFinType2        5 3.5261e+09 6.4620e+11 29416
## + HeatingQC           4 2.5002e+09 6.4722e+11 29416
## - MSSubClass          1 1.9737e+09 6.5170e+11 29416
## - YearRemodAdd        1 2.0127e+09 6.5173e+11 29416
## - GarageArea          1 2.0257e+09 6.5175e+11 29416
## + FireplaceQu         5 3.3034e+09 6.4642e+11 29416
## - WoodDeckSF          1 2.0645e+09 6.5179e+11 29416
## - GarageCars          1 2.0670e+09 6.5179e+11 29416
## + HouseStyle          7 4.8898e+09 6.4483e+11 29417
## + PavedDrive          2 4.5751e+08 6.4926e+11 29417
## - Fireplaces          1 2.2654e+09 6.5199e+11 29417
## + LotShape             3 1.1772e+09 6.4854e+11 29417
## + SaleType             8 5.4867e+09 6.4424e+11 29418
## + Foundation          5 2.7940e+09 6.4693e+11 29418
## + Alley                2 6.2449e+07 6.4966e+11 29418
## - TotRmsAbvGrd        1 2.6152e+09 6.5234e+11 29418
## + GarageType           5 2.5417e+09 6.4718e+11 29418
## + Electrical           4 1.2160e+09 6.4851e+11 29419
## + ExterCond            4 9.7028e+08 6.4875e+11 29420
## + MiscFeature          4 8.5733e+08 6.4886e+11 29420
## - ScreenPorch          1 3.6092e+09 6.5333e+11 29420
## + Heating              5 1.2519e+09 6.4847e+11 29421
## - GarageCond           4 6.9389e+09 6.5666e+11 29421
## - KitchenAbvGr        1 4.2651e+09 6.5399e+11 29421
## - Street               1 4.5828e+09 6.5430e+11 29422
## - LandContour          3 6.6041e+09 6.5633e+11 29423
## - Exterior1st          14 1.6894e+10 6.6662e+11 29423
## - LotConfig             4 7.8252e+09 6.5755e+11 29423
## - PoolArea              1 5.7112e+09 6.5543e+11 29425
## - BedroomAbvGr         1 5.8445e+09 6.5557e+11 29425
## - MasVnrArea            1 7.8810e+09 6.5760e+11 29430
## - GarageQual            4 1.1064e+10 6.6079e+11 29430
## - LandSlope              2 9.4374e+09 6.5916e+11 29431
## + Exterior2nd          14 4.4013e+09 6.4532e+11 29432

```

```

## - Functional      6 1.3900e+10 6.6362e+11 29433
## - BsmtUnfSF     1 1.0137e+10 6.5986e+11 29434
## - BsmtFinSF2     1 1.1208e+10 6.6093e+11 29437
## - ExterQual      3 1.3310e+10 6.6303e+11 29438
## - Condition1      8 1.8438e+10 6.6816e+11 29439
## - SaleCondition    5 1.6339e+10 6.6606e+11 29440
## - PoolQC          3 1.5460e+10 6.6518e+11 29442
## - YearBuilt        1 1.4649e+10 6.6437e+11 29444
## - BsmtQual         3 2.1991e+10 6.7171e+11 29456
## - KitchenQual      3 2.3492e+10 6.7321e+11 29460
## - OverallQual      1 2.3026e+10 6.7275e+11 29463
## - LotArea           1 2.4232e+10 6.7395e+11 29465
## - OverallCond      1 2.6888e+10 6.7661e+11 29471
## - BsmtExposure      3 2.9329e+10 6.7905e+11 29472
## - BsmtFinSF1        1 2.8017e+10 6.7774e+11 29474
## - X1stFlrSF         1 4.3852e+10 6.9357e+11 29507
## - Condition2         7 8.3058e+10 7.3278e+11 29576
## - Neighborhood       24 1.1344e+11 7.6316e+11 29601
## - X2ndFlrSF         1 9.6093e+10 7.4581e+11 29613
## - RoofMatl          7 1.0899e+11 7.5871e+11 29626
##
## Step: AIC=29411.9
## SalePrice ~ MSSubClass + MSZoning + LotFrontage + LotArea + Street +
##             LandContour + Utilities + LotConfig + LandSlope + Neighborhood +
##             Condition1 + Condition2 + BldgType + OverallQual + OverallCond +
##             YearBuilt + YearRemodAdd + RoofStyle + RoofMatl + Exterior1st +
##             MasVnrType + MasVnrArea + ExterQual + BsmtQual + BsmtCond +
##             BsmtExposure + BsmtFinType1 + BsmtFinSF1 + BsmtFinSF2 + BsmtUnfSF +
##             X1stFlrSF + X2ndFlrSF + LowQualFinSF + BsmtFullBath + FullBath +
##             HalfBath + BedroomAbvGr + KitchenAbvGr + KitchenQual + TotRmsAbvGrd +
##             Functional + Fireplaces + GarageYrBlt + GarageFinish + GarageCars +
##             GarageArea + GarageQual + GarageCond + WoodDeckSF + X3SsnPorch +
##             ScreenPorch + PoolArea + PoolQC + Fence + MiscVal + MoSold +
##             YrSold + SaleCondition
##
##              Df  Sum of Sq      RSS   AIC
## - MiscVal          1 1.1011e+07 6.4974e+11 29410
## - GarageYrBlt      1 2.0116e+07 6.4975e+11 29410
## - HalfBath          1 5.7653e+07 6.4979e+11 29410
## - BsmtFinType1      5 3.6673e+09 6.5340e+11 29410
## - YrSold            1 2.8136e+08 6.5001e+11 29410
## - LotFrontage        1 4.0415e+08 6.5013e+11 29411
## - LowQualFinSF      1 4.5264e+08 6.5018e+11 29411
## - X3SsnPorch         1 5.8098e+08 6.5031e+11 29411
## - GarageFinish        2 1.4969e+09 6.5123e+11 29411
## - BsmtFullBath       1 7.2986e+08 6.5046e+11 29412
## - BsmtCond           3 2.5249e+09 6.5226e+11 29412
## <none>                  6.4973e+11 29412
## - Utilities          1 1.0624e+09 6.5079e+11 29412
## - MasVnrType          3 2.8731e+09 6.5260e+11 29412
## - Fence                4 3.8655e+09 6.5360e+11 29413
## - MoSold               1 1.1987e+09 6.5093e+11 29413
## - RoofStyle            5 4.8544e+09 6.5458e+11 29413
## - FullBath             1 1.3130e+09 6.5104e+11 29413

```

```

## - MSZoning      4 4.1668e+09 6.5390e+11 29413
## - BldgType      4 4.3812e+09 6.5411e+11 29414
## + BsmtHalfBath 1 8.7675e+06 6.4972e+11 29414
## + OpenPorchSF   1 7.1767e+06 6.4972e+11 29414
## + CentralAir    1 2.7565e+06 6.4973e+11 29414
## + EnclosedPorch 1 2.2176e+06 6.4973e+11 29414
## + BsmtFinType2  5 3.4927e+09 6.4624e+11 29414
## + HeatingQC     4 2.4978e+09 6.4723e+11 29414
## - MSSubClass    1 1.9835e+09 6.5171e+11 29414
## - YearRemodAdd  1 2.0052e+09 6.5174e+11 29414
## - GarageArea    1 2.0202e+09 6.5175e+11 29414
## + FireplaceQu   5 3.3122e+09 6.4642e+11 29414
## - WoodDeckSF    1 2.0577e+09 6.5179e+11 29414
## - GarageCars    1 2.0681e+09 6.5180e+11 29414
## + PavedDrive    2 4.6309e+08 6.4927e+11 29415
## + HouseStyle    7 4.8828e+09 6.4485e+11 29415
## - Fireplaces    1 2.2624e+09 6.5199e+11 29415
## + LotShape       3 1.1670e+09 6.4856e+11 29415
## + SaleType       8 5.4772e+09 6.4425e+11 29416
## + Foundation    5 2.7962e+09 6.4693e+11 29416
## + Alley          2 6.1981e+07 6.4967e+11 29416
## - TotRmsAbvGrd  1 2.6229e+09 6.5235e+11 29416
## + GarageType    5 2.5463e+09 6.4718e+11 29416
## + Electrical    4 1.2199e+09 6.4851e+11 29417
## + ExterCond     4 9.7495e+08 6.4876e+11 29418
## + MiscFeature   4 8.5420e+08 6.4888e+11 29418
## - ScreenPorch   1 3.6145e+09 6.5335e+11 29418
## + Heating        5 1.2544e+09 6.4848e+11 29419
## - GarageCond    4 6.9433e+09 6.5667e+11 29419
## - KitchenAbvGr 1 4.2637e+09 6.5399e+11 29420
## - Street         1 4.5776e+09 6.5431e+11 29420
## - LandContour   3 6.5986e+09 6.5633e+11 29421
## - Exterior1st   14 1.6886e+10 6.6662e+11 29421
## - LotConfig      4 7.8223e+09 6.5755e+11 29421
## - PoolArea       1 5.7451e+09 6.5548e+11 29423
## - BedroomAbvGr  1 5.9170e+09 6.5565e+11 29423
## - MasVnrArea    1 7.8785e+09 6.5761e+11 29428
## - GarageQual    4 1.1084e+10 6.6081e+11 29429
## - LandSlope      2 9.4875e+09 6.5922e+11 29429
## + Exterior2nd   14 4.4026e+09 6.4533e+11 29430
## - Functional    6 1.3904e+10 6.6363e+11 29431
## - BsmtUnfSF     1 1.0142e+10 6.5987e+11 29432
## - BsmtFinSF2    1 1.1269e+10 6.6100e+11 29435
## - ExterQual     3 1.3305e+10 6.6304e+11 29436
## - Condition1    8 1.8442e+10 6.6817e+11 29437
## - SaleCondition 5 1.6349e+10 6.6608e+11 29438
## - PoolQC         3 1.5452e+10 6.6518e+11 29440
## - YearBuilt      1 1.4640e+10 6.6437e+11 29442
## - BsmtQual       3 2.1992e+10 6.7172e+11 29454
## - KitchenQual   3 2.3493e+10 6.7322e+11 29458
## - OverallQual   1 2.3064e+10 6.7279e+11 29461
## - LotArea         1 2.4231e+10 6.7396e+11 29463
## - OverallCond   1 2.6930e+10 6.7666e+11 29469
## - BsmtExposure  3 2.9329e+10 6.7906e+11 29470

```

```

## - BsmtFinSF1      1 2.8217e+10 6.7795e+11 29472
## - X1stFlrSF       1 4.3908e+10 6.9364e+11 29505
## - Condition2      7 8.3050e+10 7.3278e+11 29574
## - Neighborhood    24 1.1400e+11 7.6373e+11 29600
## - X2ndFlrSF       1 9.6148e+10 7.4588e+11 29611
## - RoofMatl        7 1.0908e+11 7.5881e+11 29624
##
## Step: AIC=29409.93
## SalePrice ~ MSSubClass + MSZoning + LotFrontage + LotArea + Street +
##             LandContour + Utilities + LotConfig + LandSlope + Neighborhood +
##             Condition1 + Condition2 + BldgType + OverallQual + OverallCond +
##             YearBuilt + YearRemodAdd + RoofStyle + RoofMatl + Exterior1st +
##             MasVnrType + MasVnrArea + ExterQual + BsmtQual + BsmtCond +
##             BsmtExposure + BsmtFinType1 + BsmtFinSF1 + BsmtFinSF2 + BsmtUnfSF +
##             X1stFlrSF + X2ndFlrSF + LowQualFinSF + BsmtFullBath + FullBath +
##             HalfBath + BedroomAbvGr + KitchenAbvGr + KitchenQual + TotRmsAbvGrd +
##             Functional + Fireplaces + GarageYrBlt + GarageFinish + GarageCars +
##             GarageArea + GarageQual + GarageCond + WoodDeckSF + X3SsnPorch +
##             ScreenPorch + PoolArea + PoolQC + Fence + MoSold + YrSold +
##             SaleCondition
##
##              Df  Sum of Sq      RSS     AIC
## - GarageYrBlt     1 1.9247e+07 6.4976e+11 29408
## - HalfBath        1 5.5665e+07 6.4980e+11 29408
## - BsmtFinType1    5 3.6751e+09 6.5342e+11 29408
## - YrSold          1 2.8250e+08 6.5002e+11 29409
## - LotFrontage     1 4.0544e+08 6.5015e+11 29409
## - LowQualFinSF   1 4.5314e+08 6.5019e+11 29409
## - X3SsnPorch     1 5.8045e+08 6.5032e+11 29409
## - GarageFinish    2 1.4859e+09 6.5123e+11 29409
## - BsmtFullBath   1 7.2713e+08 6.5047e+11 29410
## - BsmtCond        3 2.5250e+09 6.5227e+11 29410
## <none>           6.4974e+11 29410
## - Utilities       1 1.0637e+09 6.5081e+11 29410
## - MasVnrType      3 2.8764e+09 6.5262e+11 29410
## - Fence           4 3.8661e+09 6.5361e+11 29411
## - MoSold          1 1.2008e+09 6.5094e+11 29411
## - RoofStyle       5 4.8606e+09 6.5460e+11 29411
## - FullBath         1 1.3109e+09 6.5105e+11 29411
## - MSZoning        4 4.1752e+09 6.5392e+11 29411
## - BldgType         4 4.3800e+09 6.5412e+11 29412
## + MiscVal         1 1.1011e+07 6.4973e+11 29412
## + BsmtHalfBath   1 9.2963e+06 6.4973e+11 29412
## + OpenPorchSF     1 7.1884e+06 6.4973e+11 29412
## + CentralAir      1 2.6179e+06 6.4974e+11 29412
## + EnclosedPorch   1 2.1687e+06 6.4974e+11 29412
## + BsmtFinType2    5 3.4909e+09 6.4625e+11 29412
## + HeatingQC       4 2.4938e+09 6.4725e+11 29412
## - MSSubClass       1 1.9870e+09 6.5173e+11 29412
## - YearRemodAdd    1 2.0131e+09 6.5175e+11 29412
## + FireplaceQu     5 3.3218e+09 6.4642e+11 29412
## - GarageArea       1 2.0162e+09 6.5176e+11 29412
## - WoodDeckSF      1 2.0540e+09 6.5180e+11 29412
## - GarageCars       1 2.0644e+09 6.5181e+11 29413

```

```

## + PavedDrive      2 4.6269e+08 6.4928e+11 29413
## + HouseStyle     7 4.8889e+09 6.4485e+11 29413
## - Fireplaces      1 2.2635e+09 6.5201e+11 29413
## + LotShape        3 1.1589e+09 6.4858e+11 29413
## + SaleType         8 5.4704e+09 6.4427e+11 29414
## + Foundation       5 2.7957e+09 6.4695e+11 29414
## + Alley            2 6.3326e+07 6.4968e+11 29414
## - TotRmsAbvGrd    1 2.6263e+09 6.5237e+11 29414
## + GarageType       5 2.5424e+09 6.4720e+11 29414
## + Electrical        4 1.2131e+09 6.4853e+11 29415
## + ExterCond         4 9.5557e+08 6.4879e+11 29416
## + MiscFeature       4 8.6481e+08 6.4888e+11 29416
## - ScreenPorch       1 3.6246e+09 6.5337e+11 29416
## + Heating           5 1.2504e+09 6.4849e+11 29417
## - GarageCond        4 6.9341e+09 6.5668e+11 29417
## - KitchenAbvGr     1 4.2553e+09 6.5400e+11 29418
## - Street             1 4.5713e+09 6.5431e+11 29418
## - LandContour       3 6.6069e+09 6.5635e+11 29419
## - Exterior1st       14 1.6885e+10 6.6663e+11 29419
## - LotConfig          4 7.8998e+09 6.5764e+11 29420
## - PoolArea           1 5.7341e+09 6.5548e+11 29421
## - BedroomAbvGr      1 5.9247e+09 6.5567e+11 29421
## - MasVnrArea         1 7.8784e+09 6.5762e+11 29426
## - GarageQual         4 1.1073e+10 6.6082e+11 29427
## - LandSlope           2 9.4847e+09 6.5923e+11 29427
## + Exterior2nd        14 4.3967e+09 6.4534e+11 29428
## - Functional          6 1.3906e+10 6.6365e+11 29429
## - BsmtUnfSF          1 1.0164e+10 6.5991e+11 29431
## - BsmtFinSF2          1 1.1263e+10 6.6100e+11 29433
## - ExterQual            3 1.3343e+10 6.6308e+11 29434
## - Condition1           8 1.8453e+10 6.6819e+11 29435
## - SaleCondition        5 1.6350e+10 6.6609e+11 29436
## - PoolQC                3 1.5466e+10 6.6521e+11 29438
## - YearBuilt              1 1.4634e+10 6.6438e+11 29440
## - BsmtQual               3 2.1989e+10 6.7173e+11 29452
## - KitchenQual             3 2.3488e+10 6.7323e+11 29456
## - OverallQual             1 2.3131e+10 6.7287e+11 29459
## - LotArea                  1 2.4267e+10 6.7401e+11 29462
## - OverallCond              1 2.7088e+10 6.7683e+11 29468
## - BsmtExposure             3 2.9324e+10 6.7907e+11 29468
## - BsmtFinSF1                1 2.8256e+10 6.7800e+11 29470
## - X1stFlrSF                 1 4.3937e+10 6.9368e+11 29504
## - Condition2                  7 8.3266e+10 7.3301e+11 29572
## - Neighborhood                24 1.1399e+11 7.6373e+11 29598
## - X2ndFlrSF                  1 9.6173e+10 7.4591e+11 29610
## - RoofMatl                     7 1.0917e+11 7.5891e+11 29623
##
## Step: AIC=29407.97
## SalePrice ~ MSSubClass + MSZoning + LotFrontage + LotArea + Street +
##           LandContour + Utilities + LotConfig + LandSlope + Neighborhood +
##           Condition1 + Condition2 + BldgType + OverallQual + OverallCond +
##           YearBuilt + YearRemodAdd + RoofStyle + RoofMatl + Exterior1st +
##           MasVnrType + MasVnrArea + ExterQual + BsmtQual + BsmtCond +
##           BsmtExposure + BsmtFinType1 + BsmtFinSF1 + BsmtFinSF2 + BsmtUnfSF +

```

```

##      X1stFlrSF + X2ndFlrSF + LowQualFinSF + BsmtFullBath + FullBath +
##      HalfBath + BedroomAbvGr + KitchenAbvGr + KitchenQual + TotRmsAbvGrd +
##      Functional + Fireplaces + GarageFinish + GarageCars + GarageArea +
##      GarageQual + GarageCond + WoodDeckSF + X3SsnPorch + ScreenPorch +
##      PoolArea + PoolQC + Fence + MoSold + YrSold + SaleCondition
##
##              Df  Sum of Sq      RSS     AIC
## - HalfBath      1 5.6698e+07 6.4982e+11 29406
## - BsmtFinType1  5 3.6676e+09 6.5343e+11 29406
## - YrSold        1 2.8298e+08 6.5004e+11 29407
## - LotFrontage   1 4.3023e+08 6.5019e+11 29407
## - LowQualFinSF  1 4.6370e+08 6.5022e+11 29407
## - X3SsnPorch    1 5.7755e+08 6.5034e+11 29407
## - GarageFinish   2 1.4742e+09 6.5124e+11 29407
## - BsmtFullBath  1 7.3347e+08 6.5049e+11 29408
## - BsmtCond      3 2.5213e+09 6.5228e+11 29408
## <none>          6.4976e+11 29408
## - Utilities     1 1.0571e+09 6.5082e+11 29408
## - MasVnrType    3 2.8758e+09 6.5264e+11 29408
## - Fence          4 3.8527e+09 6.5361e+11 29409
## - MoSold         1 1.1990e+09 6.5096e+11 29409
## - RoofStyle      5 4.8589e+09 6.5462e+11 29409
## - FullBath       1 1.3014e+09 6.5106e+11 29409
## - MSZoning       4 4.1840e+09 6.5394e+11 29409
## - BldgType       4 4.4275e+09 6.5419e+11 29410
## + GarageYrBlt   1 1.9247e+07 6.4974e+11 29410
## + MiscVal        1 1.0142e+07 6.4975e+11 29410
## + BsmtHalfBath  1 8.5007e+06 6.4975e+11 29410
## + OpenPorchSF    1 8.4019e+06 6.4975e+11 29410
## + EnclosedPorch 1 2.0840e+06 6.4976e+11 29410
## + CentralAir     1 1.3382e+06 6.4976e+11 29410
## + BsmtFinType2   5 3.4886e+09 6.4627e+11 29410
## + HeatingQC      4 2.4756e+09 6.4729e+11 29410
## - MSSubClass     1 1.9809e+09 6.5174e+11 29410
## - YearRemodAdd   1 1.9945e+09 6.5176e+11 29410
## + FireplaceQu    5 3.3148e+09 6.4645e+11 29410
## - WoodDeckSF     1 2.0360e+09 6.5180e+11 29410
## - GarageArea      1 2.0511e+09 6.5181e+11 29411
## - GarageCars      1 2.0729e+09 6.5183e+11 29411
## + PavedDrive     2 4.6998e+08 6.4929e+11 29411
## + HouseStyle      7 4.8981e+09 6.4486e+11 29411
## - Fireplaces      1 2.3137e+09 6.5207e+11 29411
## + LotShape        3 1.1599e+09 6.4860e+11 29411
## + SaleType        8 5.4433e+09 6.4432e+11 29412
## + Foundation      5 2.7791e+09 6.4698e+11 29412
## + Alley           2 6.5727e+07 6.4970e+11 29412
## - TotRmsAbvGrd   1 2.6143e+09 6.5238e+11 29412
## + GarageType      5 2.4775e+09 6.4728e+11 29412
## + Electrical      4 1.2262e+09 6.4853e+11 29413
## + ExterCond       4 9.5199e+08 6.4881e+11 29414
## + MiscFeature     4 8.5670e+08 6.4890e+11 29414
## - ScreenPorch     1 3.6327e+09 6.5339e+11 29414
## + Heating          5 1.2345e+09 6.4853e+11 29415
## - GarageCond      4 6.9148e+09 6.5668e+11 29415

```

```

## - KitchenAbvGr    1 4.2485e+09 6.5401e+11 29416
## - Street          1 4.5759e+09 6.5434e+11 29416
## - LandContour     3 6.6292e+09 6.5639e+11 29417
## - Exterior1st     14 1.6951e+10 6.6671e+11 29418
## - LotConfig        4 7.8961e+09 6.5766e+11 29418
## - PoolArea         1 5.7404e+09 6.5550e+11 29419
## - BedroomAbvGr    1 5.9217e+09 6.5568e+11 29419
## - MasVnrArea       1 7.8882e+09 6.5765e+11 29424
## - GarageQual       4 1.1169e+10 6.6093e+11 29425
## - LandSlope         2 9.4948e+09 6.5926e+11 29425
## + Exterior2nd      14 4.3950e+09 6.4537e+11 29426
## - Functional       6 1.3887e+10 6.6365e+11 29427
## - BsmtUnfSF        1 1.0258e+10 6.6002e+11 29429
## - BsmtFinSF2       1 1.1311e+10 6.6107e+11 29431
## - ExterQual         3 1.3333e+10 6.6309e+11 29432
## - Condition1        8 1.8435e+10 6.6820e+11 29433
## - SaleCondition     5 1.6344e+10 6.6611e+11 29434
## - PoolQC            3 1.5518e+10 6.6528e+11 29436
## - YearBuilt          1 1.6617e+10 6.6638e+11 29443
## - BsmtQual           3 2.1979e+10 6.7174e+11 29450
## - KitchenQual        3 2.3476e+10 6.7324e+11 29454
## - OverallQual        1 2.3224e+10 6.7299e+11 29457
## - LotArea             1 2.4317e+10 6.7408e+11 29460
## - OverallCond         1 2.7383e+10 6.7714e+11 29466
## - BsmtExposure        3 2.9364e+10 6.7912e+11 29466
## - BsmtFinSF1          1 2.8529e+10 6.7829e+11 29469
## - X1stFlrSF            1 4.3917e+10 6.9368e+11 29502
## - Condition2           7 8.3248e+10 7.3301e+11 29570
## - Neighborhood         24 1.1417e+11 7.6393e+11 29596
## - X2ndFlrSF            1 9.6330e+10 7.4609e+11 29608
## - RoofMatl              7 1.0940e+11 7.5916e+11 29621
##
## Step: AIC=29406.1
## SalePrice ~ MSSubClass + MSZoning + LotFrontage + LotArea + Street +
##           LandContour + Utilities + LotConfig + LandSlope + Neighborhood +
##           Condition1 + Condition2 + BldgType + OverallQual + OverallCond +
##           YearBuilt + YearRemodAdd + RoofStyle + RoofMatl + Exterior1st +
##           MasVnrType + MasVnrArea + ExterQual + BsmtQual + BsmtCond +
##           BsmtExposure + BsmtFinType1 + BsmtFinSF1 + BsmtFinSF2 + BsmtUnfSF +
##           X1stFlrSF + X2ndFlrSF + LowQualFinSF + BsmtFullBath + FullBath +
##           BedroomAbvGr + KitchenAbvGr + KitchenQual + TotRmsAbvGrd +
##           Functional + Fireplaces + GarageFinish + GarageCars + GarageArea +
##           GarageQual + GarageCond + WoodDeckSF + X3SsnPorch + ScreenPorch +
##           PoolArea + PoolQC + Fence + MoSold + YrSold + SaleCondition
##
##                               Df  Sum of Sq      RSS      AIC
## - BsmtFinType1      5 3.6246e+09 6.5344e+11 29404
## - YrSold             1 2.8377e+08 6.5010e+11 29405
## - LotFrontage        1 4.3169e+08 6.5025e+11 29405
## - LowQualFinSF       1 4.5443e+08 6.5027e+11 29405
## - GarageFinish        2 1.4422e+09 6.5126e+11 29405
## - X3SsnPorch          1 5.7913e+08 6.5040e+11 29405
## - BsmtFullBath        1 7.2562e+08 6.5054e+11 29406
## - BsmtCond            3 2.5803e+09 6.5240e+11 29406

```

```

## <none>           6.4982e+11 29406
## - MasVnrType    3 2.8471e+09 6.5266e+11 29406
## - Utilities     1 1.0744e+09 6.5089e+11 29406
## - Fence          4 3.8341e+09 6.5365e+11 29407
## - MoSold         1 1.2128e+09 6.5103e+11 29407
## - RoofStyle      5 4.8652e+09 6.5468e+11 29407
## - FullBath        1 1.2965e+09 6.5111e+11 29407
## - MSZoning       4 4.3412e+09 6.5416e+11 29408
## - BldgType        4 4.3952e+09 6.5421e+11 29408
## + HalfBath        1 5.6698e+07 6.4976e+11 29408
## + GarageYrBlt    1 2.0279e+07 6.4980e+11 29408
## + OpenPorchSF    1 1.3108e+07 6.4980e+11 29408
## + BsmtHalfBath   1 9.3253e+06 6.4981e+11 29408
## + MiscVal         1 8.2027e+06 6.4981e+11 29408
## + EnclosedPorch   1 2.3726e+06 6.4982e+11 29408
## + CentralAir      1 8.5073e+05 6.4982e+11 29408
## + BsmtFinType2    5 3.5009e+09 6.4632e+11 29408
## - MSSubClass      1 1.9574e+09 6.5177e+11 29408
## + HeatingQC       4 2.4395e+09 6.4738e+11 29409
## - GarageArea      1 2.0110e+09 6.5183e+11 29409
## + FireplaceQu     5 3.3080e+09 6.4651e+11 29409
## - YearRemodAdd    1 2.0416e+09 6.5186e+11 29409
## - WoodDeckSF      1 2.0418e+09 6.5186e+11 29409
## - GarageCars      1 2.1553e+09 6.5197e+11 29409
## + PavedDrive      2 4.5294e+08 6.4936e+11 29409
## - Fireplaces       1 2.3436e+09 6.5216e+11 29409
## + HouseStyle      7 4.7399e+09 6.4508e+11 29409
## + LotShape         3 1.1516e+09 6.4867e+11 29410
## + Foundation      5 2.7874e+09 6.4703e+11 29410
## + SaleType         8 5.4367e+09 6.4438e+11 29410
## + Alley            2 6.8407e+07 6.4975e+11 29410
## - TotRmsAbvGrd   1 2.6301e+09 6.5245e+11 29410
## + GarageType       5 2.3965e+09 6.4742e+11 29411
## + Electrical       4 1.2281e+09 6.4859e+11 29411
## + ExterCond        4 9.5948e+08 6.4886e+11 29412
## + MiscFeature      4 8.3724e+08 6.4898e+11 29412
## - ScreenPorch      1 3.6842e+09 6.5350e+11 29412
## + Heating           5 1.2368e+09 6.4858e+11 29413
## - GarageCond       4 6.9131e+09 6.5673e+11 29414
## - KitchenAbvGr    1 4.2336e+09 6.5405e+11 29414
## - Street            1 4.5882e+09 6.5441e+11 29414
## - LandContour      3 6.6103e+09 6.5643e+11 29415
## - LotConfig         4 7.8624e+09 6.5768e+11 29416
## - Exterior1st      14 1.6977e+10 6.6679e+11 29416
## - PoolArea          1 5.7521e+09 6.5557e+11 29417
## - BedroomAbvGr    1 5.9992e+09 6.5582e+11 29418
## - MasVnrArea        1 7.8998e+09 6.5772e+11 29422
## - GarageQual        4 1.1139e+10 6.6096e+11 29423
## - LandSlope          2 9.4754e+09 6.5929e+11 29423
## + Exterior2nd      14 4.4156e+09 6.4540e+11 29424
## - Functional        6 1.3935e+10 6.6375e+11 29425
## - BsmtUnfSF         1 1.0225e+10 6.6004e+11 29427
## - BsmtFinSF2        1 1.1335e+10 6.6115e+11 29429
## - ExterQual         3 1.3391e+10 6.6321e+11 29430

```

```

## - Condition1      8 1.8394e+10 6.6821e+11 29431
## - SaleCondition   5 1.6460e+10 6.6628e+11 29433
## - PoolQC          3 1.5466e+10 6.6528e+11 29434
## - YearBuilt        1 1.7419e+10 6.6724e+11 29443
## - BsmtQual         3 2.2018e+10 6.7184e+11 29449
## - KitchenQual      3 2.3595e+10 6.7341e+11 29452
## - OverallQual      1 2.3226e+10 6.7304e+11 29455
## - LotArea           1 2.4264e+10 6.7408e+11 29458
## - OverallCond       1 2.7328e+10 6.7715e+11 29464
## - BsmtExposure     3 2.9312e+10 6.7913e+11 29464
## - BsmtFinSF1        1 2.8556e+10 6.7837e+11 29467
## - X1stFlrSF         1 4.4326e+10 6.9414e+11 29500
## - Condition2        7 8.3331e+10 7.3315e+11 29568
## - Neighborhood      24 1.1413e+11 7.6394e+11 29594
## - RoofMatl          7 1.0941e+11 7.5923e+11 29619
## - X2ndFlrSF         1 1.2053e+11 7.7035e+11 29652
##
## Step: AIC=29404.22
## SalePrice ~ MSSubClass + MSZoning + LotFrontage + LotArea + Street +
##             LandContour + Utilities + LotConfig + LandSlope + Neighborhood +
##             Condition1 + Condition2 + BldgType + OverallQual + OverallCond +
##             YearBuilt + YearRemodAdd + RoofStyle + RoofMatl + Exterior1st +
##             MasVnrType + MasVnrArea + ExterQual + BsmtQual + BsmtCond +
##             BsmtExposure + BsmtFinSF1 + BsmtFinSF2 + BsmtUnfSF + X1stFlrSF +
##             X2ndFlrSF + LowQualFinSF + BsmtFullBath + FullBath + BedroomAbvGr +
##             KitchenAbvGr + KitchenQual + TotRmsAbvGrd + Functional +
##             Fireplaces + GarageFinish + GarageCars + GarageArea + GarageQual +
##             GarageCond + WoodDeckSF + X3SsnPorch + ScreenPorch + PoolArea +
##             PoolQC + Fence + MoSold + YrSold + SaleCondition
##
##                               Df  Sum of Sq      RSS    AIC
## - YrSold                 1 1.5887e+08 6.5360e+11 29403
## - LowQualFinSF            1 4.2654e+08 6.5387e+11 29403
## - LotFrontage              1 4.3089e+08 6.5387e+11 29403
## - X3SsnPorch               1 6.8594e+08 6.5413e+11 29404
## - GarageFinish              2 1.6089e+09 6.5505e+11 29404
## - Utilities                 1 7.8766e+08 6.5423e+11 29404
## - Fence                     4 3.5469e+09 6.5699e+11 29404
## - BsmtCond                  3 2.6476e+09 6.5609e+11 29404
## <none>                      6.5344e+11 29404
## - MasVnrType                3 2.7978e+09 6.5624e+11 29404
## - MoSold                     1 1.2884e+09 6.5473e+11 29405
## - BsmtFullBath               1 1.3261e+09 6.5477e+11 29405
## - RoofStyle                   5 4.9412e+09 6.5838e+11 29405
## - FullBath                    1 1.3918e+09 6.5483e+11 29405
## - MSZoning                     4 4.1149e+09 6.5756e+11 29405
## - BldgType                     4 4.2423e+09 6.5768e+11 29406
## + BsmtFinType1                5 3.6246e+09 6.4982e+11 29406
## + OpenPorchSF                 1 2.7690e+07 6.5341e+11 29406
## + MiscVal                     1 1.6508e+07 6.5343e+11 29406
## + HalfBath                     1 1.3657e+07 6.5343e+11 29406
## + GarageYrBlt                  1 1.2251e+07 6.5343e+11 29406
## + BsmtHalfBath                 1 8.6755e+05 6.5344e+11 29406
## + EnclosedPorch                 1 7.6538e+05 6.5344e+11 29406

```

```

## + CentralAir      1 1.8740e+03 6.5344e+11 29406
## - MSSubClass     1 1.7972e+09 6.5524e+11 29406
## - GarageCars      1 1.9949e+09 6.5544e+11 29407
## + HeatingQC       4 2.4055e+09 6.5104e+11 29407
## + FireplaceQu     5 3.2825e+09 6.5016e+11 29407
## - WoodDeckSF      1 2.1534e+09 6.5560e+11 29407
## - Fireplaces       1 2.1640e+09 6.5561e+11 29407
## + Foundation      5 3.1876e+09 6.5025e+11 29407
## - GarageArea       1 2.2037e+09 6.5565e+11 29407
## + BsmtFinType2    5 3.1246e+09 6.5032e+11 29407
## + PavedDrive       2 4.2042e+08 6.5302e+11 29407
## - YearRemodAdd    1 2.4303e+09 6.5587e+11 29408
## + LotShape         3 1.1261e+09 6.5232e+11 29408
## + SaleType          8 5.5693e+09 6.4787e+11 29408
## + Alley             2 1.3394e+08 6.5331e+11 29408
## + HouseStyle        7 4.5318e+09 6.4891e+11 29408
## - TotRmsAbvGrd    1 2.9290e+09 6.5637e+11 29409
## + Electrical        4 1.2707e+09 6.5217e+11 29409
## + GarageType        5 2.1174e+09 6.5132e+11 29410
## + ExterCond          4 1.0429e+09 6.5240e+11 29410
## - ScreenPorch        1 3.5612e+09 6.5700e+11 29410
## + MiscFeature        4 8.8029e+08 6.5256e+11 29410
## + Heating            5 1.5554e+09 6.5189e+11 29411
## - KitchenAbvGr     1 4.2374e+09 6.5768e+11 29412
## - GarageCond          4 7.0939e+09 6.6054e+11 29412
## - Street              1 4.6080e+09 6.5805e+11 29412
## - LandContour         3 6.6475e+09 6.6009e+11 29413
## - LotConfig            4 7.6809e+09 6.6112e+11 29413
## - Exterior1st         14 1.7253e+10 6.7070e+11 29414
## - PoolArea            1 5.7513e+09 6.5919e+11 29415
## - BedroomAbvGr       1 6.9557e+09 6.6040e+11 29418
## - MasVnrArea          1 7.5537e+09 6.6100e+11 29419
## - LandSlope            2 9.2155e+09 6.6266e+11 29421
## - GarageQual           4 1.1094e+10 6.6454e+11 29421
## + Exterior2nd         14 4.3086e+09 6.4913e+11 29423
## - BsmtUnfSF            1 1.0013e+10 6.6345e+11 29424
## - BsmtFinSF2           1 1.0033e+10 6.6348e+11 29424
## - Functional            6 1.5641e+10 6.6908e+11 29427
## - Condition1            8 1.7988e+10 6.7143e+11 29428
## - ExterQual             3 1.3492e+10 6.6693e+11 29428
## - SaleCondition         5 1.6174e+10 6.6962e+11 29430
## - PoolQC                3 1.5873e+10 6.6932e+11 29433
## - YearBuilt              1 1.8064e+10 6.7151e+11 29442
## - BsmtQual              3 2.2154e+10 6.7560e+11 29447
## - KitchenQual            3 2.3601e+10 6.7704e+11 29450
## - LotArea                 1 2.3803e+10 6.7724e+11 29454
## - OverallCond            1 2.5947e+10 6.7939e+11 29459
## - OverallQual            1 2.6093e+10 6.7954e+11 29459
## - BsmtExposure            3 3.0978e+10 6.8442e+11 29466
## - BsmtFinSF1              1 3.0491e+10 6.8393e+11 29469
## - X1stFlrSF                1 4.4710e+10 6.9815e+11 29499
## - Condition2                7 8.2415e+10 7.3586e+11 29564
## - Neighborhood             24 1.1690e+11 7.7034e+11 29596
## - RoofMatl                  7 1.1059e+11 7.6403e+11 29618

```

```

## - X2ndFlrSF      1 1.2019e+11 7.7364e+11 29649
##
## Step: AIC=29402.57
## SalePrice ~ MSSubClass + MSZoning + LotFrontage + LotArea + Street +
##             LandContour + Utilities + LotConfig + LandSlope + Neighborhood +
##             Condition1 + Condition2 + BldgType + OverallQual + OverallCond +
##             YearBuilt + YearRemodAdd + RoofStyle + RoofMatl + Exterior1st +
##             MasVnrType + MasVnrArea + ExterQual + BsmtQual + BsmtCond +
##             BsmtExposure + BsmtFinSF1 + BsmtFinSF2 + BsmtUnfSF + X1stFlrSF +
##             X2ndFlrSF + LowQualFinSF + BsmtFullBath + FullBath + BedroomAbvGr +
##             KitchenAbvGr + KitchenQual + TotRmsAbvGrd + Functional +
##             Fireplaces + GarageFinish + GarageCars + GarageArea + GarageQual +
##             GarageCond + WoodDeckSF + X3SsnPorch + ScreenPorch + PoolArea +
##             PoolQC + Fence + MoSold + SaleCondition
##
##              Df   Sum of Sq      RSS     AIC
## - LowQualFinSF  1 4.0982e+08 6.5401e+11 29402
## - LotFrontage   1 4.1912e+08 6.5402e+11 29402
## - X3SsnPorch    1 6.7791e+08 6.5428e+11 29402
## - GarageFinish   2 1.6091e+09 6.5521e+11 29402
## - BsmtCond      3 2.5531e+09 6.5615e+11 29402
## - Utilities     1 7.9672e+08 6.5440e+11 29402
## - Fence          4 3.5537e+09 6.5715e+11 29402
## <none>           6.5360e+11 29403
## - MasVnrType    3 2.7312e+09 6.5633e+11 29403
## - MoSold         1 1.1906e+09 6.5479e+11 29403
## - BsmtFullBath   1 1.2681e+09 6.5487e+11 29403
## - RoofStyle      5 4.8796e+09 6.5848e+11 29403
## - FullBath        1 1.3664e+09 6.5497e+11 29404
## - MSZoning       4 4.1363e+09 6.5774e+11 29404
## - BldgType        4 4.2329e+09 6.5783e+11 29404
## + YrSold         1 1.5887e+08 6.5344e+11 29404
## + OpenPorchSF    1 3.7505e+07 6.5356e+11 29404
## + MiscVal        1 1.7349e+07 6.5358e+11 29404
## + HalfBath       1 1.4566e+07 6.5359e+11 29404
## + GarageYrBlt    1 1.2638e+07 6.5359e+11 29404
## - MSSubClass     1 1.7887e+09 6.5539e+11 29405
## + EnclosedPorch   1 9.2040e+05 6.5360e+11 29405
## + BsmtHalfBath   1 2.8005e+05 6.5360e+11 29405
## + CentralAir      1 5.2905e+04 6.5360e+11 29405
## + BsmtFinType1    5 3.4997e+09 6.5010e+11 29405
## - GarageCars      1 2.0171e+09 6.5562e+11 29405
## + HeatingQC       4 2.3578e+09 6.5124e+11 29405
## - WoodDeckSF      1 2.1299e+09 6.5573e+11 29405
## + FireplaceQu     5 3.1981e+09 6.5040e+11 29405
## - Fireplaces      1 2.1771e+09 6.5578e+11 29405
## + Foundation      5 3.1716e+09 6.5043e+11 29406
## - GarageArea       1 2.2046e+09 6.5581e+11 29406
## + BsmtFinType2    5 3.1090e+09 6.5049e+11 29406
## + PavedDrive       2 4.2085e+08 6.5318e+11 29406
## - YearRemodAdd    1 2.3586e+09 6.5596e+11 29406
## + SaleType         8 5.5726e+09 6.4803e+11 29406
## + LotShape        3 1.1046e+09 6.5250e+11 29406
## + Alley            2 1.3449e+08 6.5347e+11 29406

```

```

## + HouseStyle      7 4.5221e+09 6.4908e+11 29406
## - TotRmsAbvGrd  1 2.9461e+09 6.5655e+11 29407
## + Electrical     4 1.2951e+09 6.5231e+11 29408
## + GarageType      5 2.0296e+09 6.5157e+11 29408
## + ExterCond       4 1.0626e+09 6.5254e+11 29408
## - ScreenPorch     1 3.5197e+09 6.5712e+11 29408
## + MiscFeature     4 8.5858e+08 6.5274e+11 29409
## + Heating          5 1.5801e+09 6.5202e+11 29409
## - KitchenAbvGr   1 4.3532e+09 6.5795e+11 29410
## - GarageCond       4 7.1577e+09 6.6076e+11 29410
## - Street           1 4.6151e+09 6.5822e+11 29411
## - LandContour     3 6.5868e+09 6.6019e+11 29411
## - LotConfig         4 7.6432e+09 6.6124e+11 29412
## - Exterior1st      14 1.7198e+10 6.7080e+11 29412
## - PoolArea          1 5.7785e+09 6.5938e+11 29413
## - BedroomAbvGr    1 6.9018e+09 6.6050e+11 29416
## - MasVnrArea        1 7.5992e+09 6.6120e+11 29418
## - LandSlope          2 9.2923e+09 6.6289e+11 29419
## - GarageQual         4 1.1140e+10 6.6474e+11 29419
## + Exterior2nd      14 4.3069e+09 6.4929e+11 29421
## - BsmtFinSF2        1 9.9764e+09 6.6358e+11 29423
## - BsmtUnfSF         1 9.9884e+09 6.6359e+11 29423
## - Functional         6 1.5689e+10 6.6929e+11 29425
## - ExterQual          3 1.3336e+10 6.6694e+11 29426
## - Condition1         8 1.8040e+10 6.7164e+11 29426
## - SaleCondition      5 1.6767e+10 6.7037e+11 29430
## - PoolQC             3 1.5831e+10 6.6943e+11 29432
## - YearBuilt          1 1.8232e+10 6.7183e+11 29441
## - BsmtQual           3 2.2112e+10 6.7571e+11 29445
## - KitchenQual         3 2.3576e+10 6.7718e+11 29448
## - LotArea              1 2.3851e+10 6.7745e+11 29453
## - OverallCond         1 2.5841e+10 6.7944e+11 29457
## - OverallQual         1 2.6027e+10 6.7963e+11 29458
## - BsmtExposure        3 3.1420e+10 6.8502e+11 29465
## - BsmtFinSF1          1 3.0538e+10 6.8414e+11 29467
## - X1stFlrSF            1 4.4901e+10 6.9850e+11 29498
## - Condition2           7 8.2302e+10 7.3590e+11 29562
## - Neighborhood         24 1.1676e+11 7.7036e+11 29594
## - RoofMatl             7 1.1092e+11 7.6452e+11 29617
## - X2ndFlrSF            1 1.2035e+11 7.7395e+11 29647
##
## Step: AIC=29401.49
## SalePrice ~ MSSubClass + MSZoning + LotFrontage + LotArea + Street +
##           LandContour + Utilities + LotConfig + LandSlope + Neighborhood +
##           Condition1 + Condition2 + BldgType + OverallQual + OverallCond +
##           YearBuilt + YearRemodAdd + RoofStyle + RoofMatl + Exterior1st +
##           MasVnrType + MasVnrArea + ExterQual + BsmtQual + BsmtCond +
##           BsmtExposure + BsmtFinSF1 + BsmtFinSF2 + BsmtUnfSF + X1stFlrSF +
##           X2ndFlrSF + BsmtFullBath + FullBath + BedroomAbvGr + KitchenAbvGr +
##           KitchenQual + TotRmsAbvGrd + Functional + Fireplaces + GarageFinish +
##           GarageCars + GarageArea + GarageQual + GarageCond + WoodDeckSF +
##           X3SsnPorch + ScreenPorch + PoolArea + PoolQC + Fence + MoSold +
##           SaleCondition
##

```

	Df	Sum of Sq	RSS	AIC
## - LotFrontage	1	3.8714e+08	6.5440e+11	29400
## - X3SsnPorch	1	6.5067e+08	6.5466e+11	29401
## - GarageFinish	2	1.5810e+09	6.5559e+11	29401
## - Utilities	1	7.8290e+08	6.5479e+11	29401
## - Fence	4	3.4985e+09	6.5751e+11	29401
## - BsmtCond	3	2.6848e+09	6.5670e+11	29402
## - MasVnrType	3	2.6905e+09	6.5670e+11	29402
## <none>		6.5401e+11		29402
## - MoSold	1	1.1928e+09	6.5520e+11	29402
## - RoofStyle	5	4.8707e+09	6.5888e+11	29402
## - BsmtFullBath	1	1.2778e+09	6.5529e+11	29402
## - FullBath	1	1.3524e+09	6.5536e+11	29402
## + LowQualFinSF	1	4.0982e+08	6.5360e+11	29403
## + GrLivArea	1	4.0982e+08	6.5360e+11	29403
## - MSZoning	4	4.1848e+09	6.5820e+11	29403
## - BldgType	4	4.3092e+09	6.5832e+11	29403
## + YrSold	1	1.4215e+08	6.5387e+11	29403
## + OpenPorchSF	1	3.7735e+07	6.5397e+11	29403
## + GarageYrBlt	1	2.0628e+07	6.5399e+11	29403
## + MiscVal	1	1.7851e+07	6.5399e+11	29403
## + HalfBath	1	1.0856e+07	6.5400e+11	29404
## + EnclosedPorch	1	5.9910e+06	6.5400e+11	29404
## + CentralAir	1	1.0634e+06	6.5401e+11	29404
## + BsmtHalfBath	1	2.7688e+05	6.5401e+11	29404
## + BsmtFinType1	5	3.4808e+09	6.5053e+11	29404
## - MSSubClass	1	1.9596e+09	6.5597e+11	29404
## - GarageCars	1	2.0472e+09	6.5606e+11	29404
## - WoodDeckSF	1	2.0930e+09	6.5610e+11	29404
## + FireplaceQu	5	3.2740e+09	6.5074e+11	29404
## - GarageArea	1	2.1256e+09	6.5614e+11	29404
## + HeatingQC	4	2.2921e+09	6.5172e+11	29404
## + PavedDrive	2	4.8454e+08	6.5353e+11	29404
## + HouseStyle	7	4.9299e+09	6.4908e+11	29404
## + Foundation	5	3.1470e+09	6.5086e+11	29404
## - Fireplaces	1	2.2330e+09	6.5624e+11	29404
## + BsmtFinType2	5	3.0680e+09	6.5094e+11	29405
## - YearRemodAdd	1	2.3613e+09	6.5637e+11	29405
## + SaleType	8	5.5742e+09	6.4844e+11	29405
## + LotShape	3	1.1079e+09	6.5290e+11	29405
## + Alley	2	1.6689e+08	6.5384e+11	29405
## - TotRmsAbvGrd	1	2.6665e+09	6.5668e+11	29405
## + Electrical	4	1.2735e+09	6.5274e+11	29407
## + GarageType	5	2.0145e+09	6.5200e+11	29407
## + ExterCond	4	1.0134e+09	6.5300e+11	29407
## - ScreenPorch	1	3.5091e+09	6.5752e+11	29407
## + MiscFeature	4	8.6869e+08	6.5314e+11	29408
## + Heating	5	1.6584e+09	6.5235e+11	29408
## - GarageCond	4	6.7500e+09	6.6076e+11	29408
## - KitchenAbvGr	1	4.1836e+09	6.5819e+11	29409
## - Street	1	4.4327e+09	6.5844e+11	29409
## - LandContour	3	6.4732e+09	6.6048e+11	29410
## - LotConfig	4	7.5468e+09	6.6156e+11	29410
## - Exterior1st	14	1.7322e+10	6.7133e+11	29412

```

## - PoolArea      1 5.8709e+09 6.5988e+11 29412
## - BedroomAbvGr 1 6.9350e+09 6.6095e+11 29415
## - MasVnrArea    1 7.5669e+09 6.6158e+11 29416
## - GarageQual     4 1.0822e+10 6.6483e+11 29418
## - LandSlope      2 9.2312e+09 6.6324e+11 29418
## + Exterior2nd   14 4.2794e+09 6.4973e+11 29420
## - BsmtFinSF2    1 9.8582e+09 6.6387e+11 29421
## - BsmtUnfSF     1 9.9271e+09 6.6394e+11 29422
## - ExterQual      3 1.3223e+10 6.6723e+11 29425
## - Functional     6 1.6000e+10 6.7001e+11 29425
## - Condition1     8 1.7960e+10 6.7197e+11 29425
## - SaleCondition   5 1.6780e+10 6.7079e+11 29428
## - PoolQC         3 1.5500e+10 6.6951e+11 29430
## - YearBuilt       1 1.8445e+10 6.7246e+11 29440
## - BsmtQual        3 2.2046e+10 6.7606e+11 29444
## - KitchenQual     3 2.3528e+10 6.7754e+11 29447
## - LotArea          1 2.3756e+10 6.7777e+11 29452
## - OverallQual     1 2.5940e+10 6.7995e+11 29456
## - OverallCond      1 2.6020e+10 6.8003e+11 29456
## - BsmtExposure     3 3.1676e+10 6.8569e+11 29464
## - BsmtFinSF1       1 3.0400e+10 6.8441e+11 29466
## - X1stFlrSF        1 4.5715e+10 6.9973e+11 29498
## - Condition2        7 8.2493e+10 7.3650e+11 29561
## - Neighborhood     24 1.1683e+11 7.7084e+11 29593
## - RoofMatl         7 1.1067e+11 7.6468e+11 29616
## - X2ndFlrSF        1 1.2589e+11 7.7990e+11 29656
##
## Step: AIC=29400.35
## SalePrice ~ MSSubClass + MSZoning + LotArea + Street + LandContour +
## Utilities + LotConfig + LandSlope + Neighborhood + Condition1 +
## Condition2 + BldgType + OverallQual + OverallCond + YearBuilt +
## YearRemodAdd + RoofStyle + RoofMatl + Exterior1st + MasVnrType +
## MasVnrArea + ExterQual + BsmtQual + BsmtCond + BsmtExposure +
## BsmtFinSF1 + BsmtFinSF2 + BsmtUnfSF + X1stFlrSF + X2ndFlrSF +
## BsmtFullBath + FullBath + BedroomAbvGr + KitchenAbvGr + KitchenQual +
## TotRmsAbvGrd + Functional + Fireplaces + GarageFinish + GarageCars +
## GarageArea + GarageQual + GarageCond + WoodDeckSF + X3SsnPorch +
## ScreenPorch + PoolArea + PoolQC + Fence + MoSold + SaleCondition
##
##                         Df  Sum of Sq      RSS      AIC
## - GarageFinish      2 1.5007e+09 6.5590e+11 29400
## - X3SsnPorch        1 7.2736e+08 6.5513e+11 29400
## - Utilities         1 7.8534e+08 6.5518e+11 29400
## - Fence              4 3.5328e+09 6.5793e+11 29400
## - MasVnrType        3 2.6592e+09 6.5706e+11 29400
## <none>                  6.5440e+11 29400
## - BsmtCond         3 2.8189e+09 6.5722e+11 29401
## - MoSold            1 1.2169e+09 6.5561e+11 29401
## - BsmtFullBath      1 1.2684e+09 6.5567e+11 29401
## - FullBath           1 1.3232e+09 6.5572e+11 29401
## - RoofStyle          5 4.9715e+09 6.5937e+11 29401
## + LotFrontage        1 3.8714e+08 6.5401e+11 29402
## + LowQualFinSF      1 3.7783e+08 6.5402e+11 29402
## + GrLivArea          1 3.7783e+08 6.5402e+11 29402

```

```

## - MSZoning      4 4.2059e+09 6.5860e+11 29402
## + YrSold       1 1.3207e+08 6.5427e+11 29402
## + GarageYrBlt  1 4.4288e+07 6.5435e+11 29402
## + OpenPorchSF   1 4.2131e+07 6.5436e+11 29402
## + MiscVal       1 1.9094e+07 6.5438e+11 29402
## + HalfBath      1 1.1350e+07 6.5439e+11 29402
## + EnclosedPorch 1 9.6995e+06 6.5439e+11 29402
## + CentralAir    1 1.0700e+06 6.5440e+11 29402
## + BsmtHalfBath  1 4.3770e+05 6.5440e+11 29402
## + BsmtFinType1  5 3.4848e+09 6.5091e+11 29403
## - MSSubClass    1 1.9516e+09 6.5635e+11 29403
## - WoodDeckSF    1 2.0334e+09 6.5643e+11 29403
## + FireplaceQu   5 3.2357e+09 6.5116e+11 29403
## - GarageCars    1 2.1440e+09 6.5654e+11 29403
## - GarageArea    1 2.1571e+09 6.5656e+11 29403
## + HeatingQC     4 2.3100e+09 6.5209e+11 29403
## + PavedDrive    2 4.5825e+08 6.5394e+11 29403
## - Fireplaces    1 2.2522e+09 6.5665e+11 29403
## - YearRemodAdd  1 2.2612e+09 6.5666e+11 29403
## + HouseStyle    7 4.8228e+09 6.4958e+11 29404
## + BsmtFinType2  5 3.0151e+09 6.5138e+11 29404
## + SaleType      8 5.6235e+09 6.4877e+11 29404
## + LotShape      3 1.1050e+09 6.5329e+11 29404
## + Alley         2 1.7054e+08 6.5423e+11 29404
## + Foundation    5 2.8341e+09 6.5156e+11 29404
## - BldgType      4 5.3097e+09 6.5971e+11 29404
## - TotRmsAbvGrd  1 2.7274e+09 6.5713e+11 29404
## + Electrical    4 1.3047e+09 6.5309e+11 29405
## + GarageType    5 2.0284e+09 6.5237e+11 29406
## - ScreenPorch   1 3.4044e+09 6.5780e+11 29406
## + ExterCond     4 1.0071e+09 6.5339e+11 29406
## + MiscFeature   4 8.1829e+08 6.5358e+11 29406
## + Heating        5 1.6609e+09 6.5274e+11 29407
## - GarageCond    4 6.8607e+09 6.6126e+11 29408
## - KitchenAbvGr 1 4.2399e+09 6.5864e+11 29408
## - Street         1 4.3815e+09 6.5878e+11 29408
## - LotConfig      4 7.1859e+09 6.6158e+11 29408
## - LandContour   3 6.5070e+09 6.6090e+11 29409
## - Exterior1st   14 1.7097e+10 6.7149e+11 29410
## - PoolArea       1 5.7701e+09 6.6017e+11 29411
## - BedroomAbvGr  1 6.8089e+09 6.6121e+11 29414
## - MasVnrArea    1 7.5707e+09 6.6197e+11 29415
## - GarageQual    4 1.1048e+10 6.6545e+11 29417
## + Exterior2nd   14 4.3294e+09 6.5007e+11 29419
## - LandSlope      2 1.0097e+10 6.6449e+11 29419
## - BsmtUnfSF     1 9.7495e+09 6.6415e+11 29420
## - BsmtFinSF2    1 9.8103e+09 6.6421e+11 29420
## - ExterQual      3 1.3109e+10 6.6751e+11 29423
## - Functional     6 1.6127e+10 6.7052e+11 29424
## - Condition1     8 1.7991e+10 6.7239e+11 29424
## - SaleCondition  5 1.6791e+10 6.7119e+11 29427
## - PoolQC         3 1.5975e+10 6.7037e+11 29430
## - YearBuilt      1 1.8501e+10 6.7290e+11 29439
## - BsmtQual       3 2.2432e+10 6.7683e+11 29444

```

```

## - KitchenQual      3 2.3729e+10 6.7813e+11 29446
## - OverallQual     1 2.5851e+10 6.8025e+11 29455
## - OverallCond     1 2.6162e+10 6.8056e+11 29456
## - LotArea          1 2.7118e+10 6.8152e+11 29458
## - BsmtExposure    3 3.1703e+10 6.8610e+11 29463
## - BsmtFinSF1       1 3.0106e+10 6.8450e+11 29464
## - X1stFlrSF        1 4.7075e+10 7.0147e+11 29500
## - Condition2       7 8.2203e+10 7.3660e+11 29559
## - Neighborhood     24 1.1707e+11 7.7147e+11 29593
## - RoofMatl         7 1.1177e+11 7.6617e+11 29617
## - X2ndFlrSF        1 1.2583e+11 7.8023e+11 29655
##
## Step: AIC=29399.7
## SalePrice ~ MSSubClass + MSZoning + LotArea + Street + LandContour +
## Utilities + LotConfig + LandSlope + Neighborhood + Condition1 +
## Condition2 + BldgType + OverallQual + OverallCond + YearBuilt +
## YearRemodAdd + RoofStyle + RoofMatl + Exterior1st + MasVnrType +
## MasVnrArea + ExterQual + BsmtQual + BsmtCond + BsmtExposure +
## BsmtFinSF1 + BsmtFinSF2 + BsmtUnfSF + X1stFlrSF + X2ndFlrSF +
## BsmtFullBath + FullBath + BedroomAbvGr + KitchenAbvGr + KitchenQual +
## TotRmsAbvGrd + Functional + Fireplaces + GarageCars + GarageArea +
## GarageQual + GarageCond + WoodDeckSF + X3SsnPorch + ScreenPorch +
## PoolArea + PoolQC + Fence + MoSold + SaleCondition
##
##                                     Df  Sum of Sq      RSS   AIC
## - X3SsnPorch      1 5.8473e+08 6.5648e+11 29399
## <none>                  6.5590e+11 29400
## - BsmtCond       3 2.7208e+09 6.5862e+11 29400
## - Utilities      1 9.4394e+08 6.5684e+11 29400
## - FullBath        1 1.0610e+09 6.5696e+11 29400
## - Fence           4 3.7670e+09 6.5967e+11 29400
## - MasVnrType      3 2.9140e+09 6.5881e+11 29400
## - MoSold          1 1.1629e+09 6.5706e+11 29400
## + GarageFinish    2 1.5007e+09 6.5440e+11 29400
## - BsmtFullBath   1 1.2078e+09 6.5711e+11 29400
## + LowQualFinSF   1 3.5396e+08 6.5554e+11 29401
## + GrLivArea       1 3.5396e+08 6.5554e+11 29401
## - RoofStyle       5 5.1033e+09 6.6100e+11 29401
## + LotFrontage     1 3.0678e+08 6.5559e+11 29401
## + YrSold          1 1.3345e+08 6.5577e+11 29401
## - MSZoning        4 4.3970e+09 6.6030e+11 29402
## + BsmtFinType1   5 3.6405e+09 6.5226e+11 29402
## + OpenPorchSF     1 2.6796e+07 6.5587e+11 29402
## + GarageYrBlt    1 2.1281e+07 6.5588e+11 29402
## + CentralAir      1 3.0209e+06 6.5590e+11 29402
## + EnclosedPorch   1 1.7888e+06 6.5590e+11 29402
## + MiscVal         1 1.6045e+06 6.5590e+11 29402
## + HalfBath        1 3.3866e+05 6.5590e+11 29402
## + BsmtHalfBath   1 2.1864e+04 6.5590e+11 29402
## - GarageArea       1 1.9409e+09 6.5784e+11 29402
## - WoodDeckSF      1 1.9937e+09 6.5789e+11 29402
## + FireplaceQu     5 3.3448e+09 6.5255e+11 29402
## - MSSubClass       1 2.1743e+09 6.5807e+11 29402
## + HeatingQC        4 2.2540e+09 6.5364e+11 29403

```

```

## + PavedDrive      2 4.5342e+08 6.5545e+11 29403
## + HouseStyle     7 4.9190e+09 6.5098e+11 29403
## - Fireplaces     1 2.2653e+09 6.5816e+11 29403
## - YearRemodAdd   1 2.2882e+09 6.5819e+11 29403
## + BsmtFinType2   5 3.0724e+09 6.5283e+11 29403
## - GarageCars     1 2.3916e+09 6.5829e+11 29403
## + SaleType        8 5.6554e+09 6.5024e+11 29403
## + LotShape        3 1.1629e+09 6.5474e+11 29403
## - BldgType        4 5.1654e+09 6.6106e+11 29403
## + Alley           2 1.7016e+08 6.5573e+11 29403
## + Foundation     5 2.7269e+09 6.5317e+11 29404
## - TotRmsAbvGrd   1 2.8928e+09 6.5879e+11 29404
## + GarageType      5 2.4268e+09 6.5347e+11 29404
## + Electrical      4 1.3178e+09 6.5458e+11 29405
## - ScreenPorch     1 3.4840e+09 6.5938e+11 29405
## + ExterCond       4 9.1517e+08 6.5498e+11 29406
## + MiscFeature     4 7.9385e+08 6.5510e+11 29406
## + Heating          5 1.6899e+09 6.5421e+11 29406
## - GarageCond      4 6.8271e+09 6.6273e+11 29407
## - KitchenAbvGr    1 4.3744e+09 6.6027e+11 29407
## - LotConfig        4 7.1070e+09 6.6301e+11 29407
## - Street           1 4.4937e+09 6.6039e+11 29408
## - LandContour     3 6.3377e+09 6.6224e+11 29408
## - Exterior1st     14 1.7213e+10 6.7311e+11 29410
## - PoolArea         1 5.8879e+09 6.6179e+11 29411
## - BedroomAbvGr    1 6.7276e+09 6.6263e+11 29413
## - MasVnrArea       1 7.8768e+09 6.6378e+11 29415
## - GarageQual       4 1.0919e+10 6.6682e+11 29416
## - LandSlope         2 9.8801e+09 6.6578e+11 29418
## + Exterior2nd     14 4.1605e+09 6.5174e+11 29418
## - BsmtUnfSF        1 9.5046e+09 6.6540e+11 29419
## - BsmtFinSF2       1 9.8169e+09 6.6572e+11 29419
## - Functional       6 1.5770e+10 6.7167e+11 29422
## - Condition1        8 1.8034e+10 6.7393e+11 29423
## - ExterQual         3 1.3476e+10 6.6937e+11 29423
## - SaleCondition     5 1.6640e+10 6.7254e+11 29426
## - PoolQC            3 1.6718e+10 6.7262e+11 29430
## - YearBuilt          1 1.8612e+10 6.7451e+11 29439
## - BsmtQual          3 2.3293e+10 6.7919e+11 29445
## - KitchenQual        3 2.5059e+10 6.8096e+11 29448
## - OverallQual        1 2.5611e+10 6.8151e+11 29454
## - OverallCond        1 2.6394e+10 6.8229e+11 29455
## - LotArea             1 2.6843e+10 6.8274e+11 29456
## - BsmtExposure       3 3.1289e+10 6.8719e+11 29462
## - BsmtFinSF1          1 2.9967e+10 6.8587e+11 29463
## - X1stFlrSF           1 4.6913e+10 7.0281e+11 29499
## - Condition2          7 8.2259e+10 7.3816e+11 29558
## - Neighborhood        24 1.1764e+11 7.7354e+11 29593
## - RoofMatl            7 1.1220e+11 7.6810e+11 29616
## - X2ndFlrSF           1 1.2597e+11 7.8187e+11 29654
##
## Step: AIC=29399
## SalePrice ~ MSSubClass + MSZoning + LotArea + Street + LandContour +
## Utilities + LotConfig + LandSlope + Neighborhood + Condition1 +

```

```

## Condition2 + BldgType + OverallQual + OverallCond + YearBuilt +
## YearRemodAdd + RoofStyle + RoofMatl + Exterior1st + MasVnrType +
## MasVnrArea + ExterQual + BsmtQual + BsmtCond + BsmtExposure +
## BsmtFinSF1 + BsmtFinSF2 + BsmtUnfSF + X1stFlrSF + X2ndFlrSF +
## BsmtFullBath + FullBath + BedroomAbvGr + KitchenAbvGr + KitchenQual +
## TotRmsAbvGrd + Functional + Fireplaces + GarageCars + GarageArea +
## GarageQual + GarageCond + WoodDeckSF + ScreenPorch + PoolArea +
## PoolQC + Fence + MoSold + SaleCondition
##
##          Df  Sum of Sq      RSS     AIC
## <none>           6.5648e+11 29399
## - Utilities      1 9.3960e+08 6.5742e+11 29399
## - BsmtCond       3 2.7941e+09 6.5928e+11 29399
## - Fence          4 3.7354e+09 6.6022e+11 29399
## - MasVnrType     3 2.8490e+09 6.5933e+11 29399
## - FullBath        1 1.0955e+09 6.5758e+11 29399
## - MoSold          1 1.1129e+09 6.5760e+11 29400
## + X3SsnPorch     1 5.8473e+08 6.5590e+11 29400
## - BsmtFullBath   1 1.2246e+09 6.5771e+11 29400
## + GarageFinish    2 1.3580e+09 6.5513e+11 29400
## + LotFrontage     1 3.7034e+08 6.5611e+11 29400
## + LowQualFinSF   1 3.2869e+08 6.5615e+11 29400
## + GrLivArea       1 3.2869e+08 6.5615e+11 29400
## - RoofStyle       5 5.1072e+09 6.6159e+11 29400
## + BsmtFinType1   5 3.7411e+09 6.5274e+11 29401
## + YrSold          1 1.2635e+08 6.5636e+11 29401
## - MSZoning         4 4.4775e+09 6.6096e+11 29401
## + GarageYrBlt     1 2.0718e+07 6.5646e+11 29401
## + OpenPorchSF     1 1.9087e+07 6.5646e+11 29401
## + MiscVal          1 2.0871e+06 6.5648e+11 29401
## + CentralAir       1 2.0088e+06 6.5648e+11 29401
## + BsmtHalfBath    1 1.5793e+06 6.5648e+11 29401
## + HalfBath         1 4.9239e+05 6.5648e+11 29401
## + EnclosedPorch    1 3.4113e+05 6.5648e+11 29401
## - WoodDeckSF       1 1.8705e+09 6.5835e+11 29401
## - GarageArea        1 1.9875e+09 6.5847e+11 29401
## + FireplaceQu      5 3.2770e+09 6.5321e+11 29402
## + HeatingQC         4 2.3402e+09 6.5414e+11 29402
## - Fireplaces        1 2.1687e+09 6.5865e+11 29402
## + PavedDrive        2 4.7506e+08 6.5601e+11 29402
## - MSSubClass        1 2.2554e+09 6.5874e+11 29402
## + HouseStyle        7 4.8501e+09 6.5163e+11 29402
## + BsmtFinType2      5 3.0313e+09 6.5345e+11 29402
## - YearRemodAdd     1 2.3682e+09 6.5885e+11 29402
## - GarageCars        1 2.3719e+09 6.5886e+11 29402
## - BldgType          4 5.1519e+09 6.6164e+11 29402
## + LotShape          3 1.1560e+09 6.5533e+11 29402
## + SaleType          8 5.6280e+09 6.5086e+11 29402
## + Alley              2 1.7518e+08 6.5631e+11 29403
## - TotRmsAbvGrd      1 2.8207e+09 6.5930e+11 29403
## + Foundation        5 2.4302e+09 6.5405e+11 29404
## + GarageType         5 2.2582e+09 6.5423e+11 29404
## + Electrical         4 1.3322e+09 6.5515e+11 29404
## - ScreenPorch        1 3.3830e+09 6.5987e+11 29404

```

```

## + ExterCond      4 9.0959e+08 6.5557e+11 29405
## + MiscFeature   4 8.1178e+08 6.5567e+11 29405
## + Heating        5 1.6874e+09 6.5480e+11 29405
## - GarageCond    4 6.8855e+09 6.6337e+11 29406
## - LotConfig     4 7.0741e+09 6.6356e+11 29407
## - KitchenAbvGr 1 4.3925e+09 6.6088e+11 29407
## - LandContour   3 6.2753e+09 6.6276e+11 29407
## - Street         1 4.5143e+09 6.6100e+11 29407
## - Exterior1st   14 1.7244e+10 6.7373e+11 29409
## - PoolArea       1 5.8530e+09 6.6234e+11 29410
## - BedroomAbvGr  1 6.8493e+09 6.6333e+11 29412
## - MasVnrArea    1 7.8555e+09 6.6434e+11 29414
## - GarageQual    4 1.0988e+10 6.6747e+11 29415
## - LandSlope      2 9.9023e+09 6.6639e+11 29417
## + Exterior2nd   14 4.1444e+09 6.5234e+11 29418
## - BsmtUnfSF     1 9.4896e+09 6.6597e+11 29418
## - BsmtFinSF2    1 9.7177e+09 6.6620e+11 29418
## - Functional    6 1.5894e+10 6.7238e+11 29422
## - Condition1    8 1.7764e+10 6.7425e+11 29422
## - ExterQual     3 1.3670e+10 6.7015e+11 29423
## - SaleCondition 5 1.6622e+10 6.7311e+11 29426
## - PoolQC         3 1.6613e+10 6.7310e+11 29430
## - YearBuilt      1 1.8711e+10 6.7519e+11 29438
## - BsmtQual       3 2.3124e+10 6.7961e+11 29444
## - KitchenQual    3 2.5022e+10 6.8151e+11 29448
## - OverallQual   1 2.5590e+10 6.8207e+11 29453
## - OverallCond   1 2.6582e+10 6.8307e+11 29455
## - LotArea         1 2.7049e+10 6.8353e+11 29456
## - BsmtExposure   3 3.1106e+10 6.8759e+11 29461
## - BsmtFinSF1     1 2.9940e+10 6.8642e+11 29462
## - X1stFlrSF      1 4.7636e+10 7.0412e+11 29499
## - Condition2     7 8.3197e+10 7.3968e+11 29559
## - Neighborhood   24 1.1739e+11 7.7387e+11 29591
## - RoofMatl       7 1.1276e+11 7.6925e+11 29616
## - X2ndFlrSF      1 1.2694e+11 7.8342e+11 29655

summary(fit.both)

##
## Call:
## lm(formula = SalePrice ~ MSSubClass + MSZoning + LotArea + Street +
##     LandContour + Utilities + LotConfig + LandSlope + Neighborhood +
##     Condition1 + Condition2 + BldgType + OverallQual + OverallCond +
##     YearBuilt + YearRemodAdd + RoofStyle + RoofMatl + Exterior1st +
##     MasVnrType + MasVnrArea + ExterQual + BsmtQual + BsmtCond +
##     BsmtExposure + BsmtFinSF1 + BsmtFinSF2 + BsmtUnfSF + X1stFlrSF +
##     X2ndFlrSF + BsmtFullBath + FullBath + BedroomAbvGr + KitchenAbvGr +
##     KitchenQual + TotRmsAbvGrd + Functional + Fireplaces + GarageCars +
##     GarageArea + GarageQual + GarageCond + WoodDeckSF + ScreenPorch +
##     PoolArea + PoolQC + Fence + MoSold + SaleCondition, data = data[-c(1,
##     2)])
##
## Residuals:
##    Min      1Q  Median      3Q     Max 
## -178620 -9191     25    9857 178620

```

```

## 
## Coefficients: (3 not defined because of singularities)
##                                     Estimate Std. Error t value Pr(>|t|) 
## (Intercept)                 -1.748e+06 1.678e+05 -10.415 < 2e-16 ***
## MSSubClass                  -9.683e+01 4.573e+01 -2.117 0.034413 * 
## MSZoningFV                  3.240e+04 1.120e+04  2.892 0.003893 ** 
## MSZoningRH                  1.945e+04 1.116e+04  1.742 0.081670 .  
## MSZoningRL                  2.377e+04 9.510e+03  2.500 0.012538 * 
## MSZoningRM                  1.961e+04 8.866e+03  2.211 0.027180 * 
## LotArea                      6.953e-01 9.482e-02  7.333 3.94e-13 *** 
## StreetPave                   3.360e+04 1.122e+04  2.996 0.002790 ** 
## LandContourHLS                9.203e+03 4.835e+03  1.904 0.057180 .  
## LandContourLow                -8.789e+03 5.926e+03 -1.483 0.138297 
## LandContourLvl                6.373e+03 3.448e+03  1.848 0.064787 .  
## UtilitiesNoSeWa              -3.257e+04 2.383e+04 -1.367 0.171962 
## LotConfigCulDSac              7.204e+03 2.985e+03  2.413 0.015956 * 
## LotConfigFR2                  -6.344e+03 3.804e+03 -1.668 0.095564 .  
## LotConfigFR3                  -1.327e+04 1.224e+04 -1.085 0.278303 
## LotConfigInside                1.304e+03 1.656e+03 -0.787 0.431274 
## LandSlopeMod                  5.627e+03 3.703e+03  1.520 0.128876 
## LandSlopeSev                  -3.924e+04 1.034e+04 -3.794 0.000155 *** 
## NeighborhoodBlueste            2.389e+03 1.826e+04  0.131 0.895905 
## NeighborhoodBrDale             -1.736e+03 1.030e+04 -0.169 0.866209 
## NeighborhoodBrkSide             -2.112e+03 8.791e+03 -0.240 0.810168 
## NeighborhoodClearCr            -1.159e+04 8.734e+03 -1.327 0.184753 
## NeighborhoodCollgCr             -8.688e+03 6.870e+03 -1.265 0.206228 
## NeighborhoodCrawfor             1.187e+04 8.089e+03  1.467 0.142583 
## NeighborhoodEdwards              -1.815e+04 7.584e+03 -2.393 0.016855 * 
## NeighborhoodGilbert              -1.181e+04 7.262e+03 -1.627 0.104054 
## NeighborhoodIDOTRR              -6.470e+03 1.000e+04 -0.647 0.517978 
## NeighborhoodMeadowV              -8.468e+03 1.050e+04 -0.806 0.420150 
## NeighborhoodMitchel              -2.170e+04 7.742e+03 -2.803 0.005144 ** 
## NeighborhoodNAmes                -1.617e+04 7.405e+03 -2.184 0.029137 * 
## NeighborhoodNoRidge              2.873e+04 7.991e+03  3.595 0.000336 *** 
## NeighborhoodNPkVill              6.026e+03 1.043e+04  0.578 0.563376 
## NeighborhoodNridgHt              1.639e+04 7.059e+03  2.322 0.020401 * 
## NeighborhoodNWAmes              -1.894e+04 7.585e+03 -2.497 0.012644 * 
## NeighborhoodOldTown              -1.154e+04 9.036e+03 -1.277 0.201803 
## NeighborhoodSawyer                -1.083e+04 7.750e+03 -1.398 0.162464 
## NeighborhoodSawyerW              -2.866e+03 7.427e+03 -0.386 0.699648 
## NeighborhoodSomerset              -2.046e+03 8.564e+03 -0.239 0.811244 
## NeighborhoodStoneBr              3.557e+04 7.876e+03  4.515 6.89e-06 *** 
## NeighborhoodSWISU                 -5.801e+03 9.037e+03 -0.642 0.521034 
## NeighborhoodTimber                -1.242e+04 7.741e+03 -1.605 0.108807 
## NeighborhoodVeenker              -1.410e+02 9.856e+03 -0.014 0.988585 
## Condition1Feedr                  7.060e+03 4.679e+03  1.509 0.131586 
## Condition1Norm                  1.507e+04 3.882e+03  3.883 0.000109 *** 
## Condition1PosA                  7.400e+03 9.462e+03  0.782 0.434306 
## Condition1PosN                  1.230e+04 6.961e+03  1.766 0.077565 .  
## Condition1RRAe                  -1.212e+04 8.244e+03 -1.471 0.141657 
## Condition1RRAn                  1.369e+04 6.474e+03  2.115 0.034647 * 
## Condition1RRNe                  -2.884e+01 1.690e+04 -0.002 0.998639 
## Condition1RRNn                  1.003e+04 1.198e+04  0.837 0.402663 
## Condition2Feedr                  -1.082e+04 2.129e+04 -0.508 0.611253

```

## Condition2Norm	-1.207e+04	1.832e+04	-0.659	0.510053
## Condition2PosA	3.890e+04	2.998e+04	1.297	0.194785
## Condition2PosN	-2.384e+05	2.583e+04	-9.230	< 2e-16 ***
## Condition2RRAe	-1.151e+05	4.155e+04	-2.770	0.005693 **
## Condition2RRAn	-1.570e+04	2.950e+04	-0.532	0.594537
## Condition2RRNn	-1.077e+04	2.501e+04	-0.431	0.666732
## BldgType2fmCon	3.790e+03	8.283e+03	0.458	0.647355
## BldgTypeDuplex	-3.384e+03	6.221e+03	-0.544	0.586514
## BldgTypeTwnhs	-1.520e+04	6.944e+03	-2.190	0.028721 *
## BldgTypeTwnhsE	-1.084e+04	5.579e+03	-1.942	0.052305 .
## OverallQual	6.684e+03	9.372e+02	7.132	1.63e-12 ***
## OverallCond	5.573e+03	7.667e+02	7.269	6.21e-13 ***
## YearBuilt	3.719e+02	6.097e+01	6.099	1.41e-09 ***
## YearRemodAdd	1.097e+02	5.057e+01	2.170	0.030207 *
## RoofStyleGable	6.940e+03	1.739e+04	0.399	0.689965
## RoofStyleGambrel	1.101e+04	1.888e+04	0.583	0.559937
## RoofStyleHip	7.307e+03	1.745e+04	0.419	0.675567
## RoofStyleMansard	2.180e+04	1.991e+04	1.095	0.273703
## RoofStyleShed	9.152e+04	3.286e+04	2.785	0.005429 **
## RoofMatlCompShg	5.785e+05	4.328e+04	13.365	< 2e-16 ***
## RoofMatlMembran	6.664e+05	5.380e+04	12.386	< 2e-16 ***
## RoofMatlMetal	6.395e+05	5.359e+04	11.932	< 2e-16 ***
## RoofMatlRoll	5.701e+05	4.956e+04	11.503	< 2e-16 ***
## RoofMatlTar&Grv	5.772e+05	4.703e+04	12.272	< 2e-16 ***
## RoofMatlWdShake	5.700e+05	4.574e+04	12.462	< 2e-16 ***
## RoofMatlWdShngl	6.322e+05	4.403e+04	14.358	< 2e-16 ***
## Exterior1stAsphShn	-1.120e+04	2.395e+04	-0.467	0.640227
## Exterior1stBrkComm	6.361e+02	1.854e+04	0.034	0.972629
## Exterior1stBrkFace	1.665e+04	6.692e+03	2.488	0.012988 *
## Exterior1stCBlock	-1.204e+04	2.531e+04	-0.476	0.634305
## Exterior1stCemntBd	2.370e+03	7.063e+03	0.336	0.737230
## Exterior1stHdBoard	-3.804e+03	6.053e+03	-0.629	0.529776
## Exterior1stImStucc	-8.298e+03	2.405e+04	-0.345	0.730177
## Exterior1stMetalSd	1.077e+03	5.931e+03	0.182	0.855894
## Exterior1stPlywood	-6.772e+03	6.384e+03	-1.061	0.288977
## Exterior1stStone	-6.159e+03	1.911e+04	-0.322	0.747283
## Exterior1stStucco	9.193e+02	7.436e+03	0.124	0.901638
## Exterior1stVinylSd	-2.274e+02	5.968e+03	-0.038	0.969610
## Exterior1stWd Sdng	-9.239e+02	5.895e+03	-0.157	0.875496
## Exterior1stWdShing	-3.676e+03	7.364e+03	-0.499	0.617747
## MasVnrTypeBrkFace	6.672e+03	6.497e+03	1.027	0.304651
## MasVnrTypeNone	1.011e+04	6.558e+03	1.542	0.123410
## MasVnrTypeStone	1.083e+04	6.879e+03	1.575	0.115523
## MasVnrArea	2.199e+01	5.566e+00	3.952	8.18e-05 ***
## ExterQualFa	-7.131e+03	9.703e+03	-0.735	0.462500
## ExterQualGd	-2.247e+04	4.600e+03	-4.885	1.16e-06 ***
## ExterQualTA	-2.228e+04	5.069e+03	-4.395	1.20e-05 ***
## BsmtQualFa	-1.329e+04	5.902e+03	-2.252	0.024509 *
## BsmtQualGd	-2.078e+04	3.140e+03	-6.617	5.35e-11 ***
## BsmtQualNone	-5.026e+03	8.202e+03	-0.613	0.540162
## BsmtQualTA	-1.798e+04	3.832e+03	-4.692	2.98e-06 ***
## BsmtCondGd	1.075e+03	4.980e+03	0.216	0.829101
## BsmtCondNone	NA	NA	NA	NA
## BsmtCondPo	4.125e+04	2.089e+04	1.974	0.048598 *

## BsmtCondTA	4.078e+03	3.932e+03	1.037	0.299808
## BsmtExposureGd	1.578e+04	2.854e+03	5.528	3.91e-08 ***
## BsmtExposureMn	-3.117e+03	2.860e+03	-1.090	0.275929
## BsmtExposureNo	-6.075e+03	2.024e+03	-3.001	0.002740 **
## BsmtExposureNone		NA	NA	NA
## BsmtFinSF1	3.457e+01	4.482e+00	7.715	2.40e-14 ***
## BsmtFinSF2	2.478e+01	5.638e+00	4.395	1.20e-05 ***
## BsmtUnfSF	1.842e+01	4.240e+00	4.343	1.51e-05 ***
## X1stFlrSF	4.797e+01	4.930e+00	9.731	< 2e-16 ***
## X2ndFlrSF	5.501e+01	3.463e+00	15.885	< 2e-16 ***
## BsmtFullBath	2.701e+03	1.731e+03	1.560	0.118939
## FullBath	2.810e+03	1.904e+03	1.476	0.140269
## BedroomAbvGr	-4.660e+03	1.263e+03	-3.690	0.000234 ***
## KitchenAbvGr	-1.538e+04	5.205e+03	-2.955	0.003184 **
## KitchenQualFa	-1.866e+04	5.691e+03	-3.278	0.001072 **
## KitchenQualGd	-2.306e+04	3.311e+03	-6.965	5.18e-12 ***
## KitchenQualTA	-2.305e+04	3.731e+03	-6.178	8.65e-10 ***
## TotRmsAbvGrd	2.111e+03	8.915e+02	2.368	0.018033 *
## FunctionalMaj2	-6.488e+03	1.284e+04	-0.505	0.613340
## FunctionalMin1	5.645e+03	7.950e+03	0.710	0.477783
## FunctionalMin2	8.456e+03	7.853e+03	1.077	0.281790
## FunctionalMod	1.288e+03	9.290e+03	0.139	0.889778
## FunctionalSev	-3.603e+04	2.650e+04	-1.360	0.174151
## FunctionalTyp	1.866e+04	6.846e+03	2.725	0.006506 **
## Fireplaces	2.611e+03	1.258e+03	2.076	0.038060 *
## GarageCars	4.661e+03	2.147e+03	2.171	0.030079 *
## GarageArea	1.420e+01	7.144e+00	1.988	0.047057 *
## GarageQualFa	-1.233e+05	2.676e+04	-4.606	4.51e-06 ***
## GarageQualGd	-1.171e+05	2.752e+04	-4.254	2.25e-05 ***
## GarageQualNone	-1.347e+03	1.678e+04	-0.080	0.936019
## GarageQualPo	-1.373e+05	3.317e+04	-4.141	3.69e-05 ***
## GarageQualTA	-1.196e+05	2.654e+04	-4.507	7.16e-06 ***
## GarageCondFa	1.078e+05	3.149e+04	3.423	0.000639 ***
## GarageCondGd	1.020e+05	3.250e+04	3.139	0.001733 **
## GarageCondNone		NA	NA	NA
## GarageCondPo	1.109e+05	3.380e+04	3.280	0.001066 **
## GarageCondTA	1.103e+05	3.118e+04	3.537	0.000419 ***
## WoodDeckSF	1.069e+01	5.543e+00	1.928	0.054035 .
## ScreenPorch	3.079e+01	1.187e+01	2.593	0.009614 **
## PoolArea	5.613e+02	1.646e+02	3.411	0.000667 ***
## PoolQCFa	-1.450e+05	2.557e+04	-5.672	1.73e-08 ***
## PoolQCGd	-1.161e+05	3.073e+04	-3.777	0.000166 ***
## PoolQCNone	1.818e+05	8.950e+04	2.031	0.042439 *
## FenceGdWo	7.647e+03	4.630e+03	1.652	0.098856 .
## FenceMnPrv	9.435e+03	3.778e+03	2.498	0.012629 *
## FenceMnWw	1.072e+03	7.798e+03	0.137	0.890687
## FenceNone	8.125e+03	3.463e+03	2.346	0.019121 *
## MoSold	-3.443e+02	2.315e+02	-1.487	0.137152
## SaleConditionAdjLand	9.767e+03	1.271e+04	0.769	0.442317
## SaleConditionAlloca	-1.861e+03	8.136e+03	-0.229	0.819154
## SaleConditionFamily	1.095e+03	5.761e+03	0.190	0.849296
## SaleConditionNormal	5.739e+03	2.592e+03	2.214	0.027010 *
## SaleConditionPartial	1.911e+04	3.636e+03	5.254	1.73e-07 ***
## ---				

```

## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 22430 on 1305 degrees of freedom
## Multiple R-squared:  0.9287, Adjusted R-squared:  0.9203
## F-statistic: 110.4 on 154 and 1305 DF,  p-value: < 2.2e-16

```

EDA

From the bidirectional elimination, we notice that the most significant variables are : SaleCondition, PoolQC, PoolArea, GarageCond, GarageQual, KitchenQual, Neighborhood, BedroomAbvGr, X1stFlrSF, X2ndFlrSF, BsmtFinSF1, BsmtFinSF2, BsmtUnfSF, BsmtExposure, BsmtQual, ExterQual, MasVnrArea, RoofMatl, YearBuilt, OverallQual, OverallCond, Condition2, Condition1, LandSlope, LotArea

```
## [1] 25
```

Quantitative variables analysis

Identify numerical variables

```
#Names of quantitatives variables
names_quant <- colnames(data[, most][which(sapply(data[,most],is.numeric))])
```

```
names_quant
```

```
## [1] "PoolArea"      "BedroomAbvGr"   "X1stFlrSF"     "X2ndFlrSF"     "BsmtFinSF1"
## [6] "BsmtFinSF2"    "BsmtUnfSF"     "MasVnrArea"    "YearBuilt"     "OverallQual"
## [11] "OverallCond"   "LotArea"
cat("We have ", length(names_quant), "quantitative variables")
```

```
## We have 12 quantitative variables
```

Correlation matrixes

Pearson

```
cor(data[,c("SalePrice",names_quant)])
```

	SalePrice	PoolArea	BedroomAbvGr	X1stFlrSF	X2ndFlrSF
## SalePrice	1.00000000	0.092403549	0.16821315	0.60585218	0.319333803
## PoolArea	0.09240355	1.000000000	0.07070258	0.13152498	0.081486878
## BedroomAbvGr	0.16821315	0.070702584	1.00000000	0.12740075	0.502900613
## X1stFlrSF	0.60585218	0.131524976	0.12740075	1.00000000	-0.202646181
## X2ndFlrSF	0.31933380	0.081486878	0.50290061	-0.20264618	1.000000000
## BsmtFinSF1	0.38641981	0.140491286	-0.10735468	0.44586266	-0.137078986
## BsmtFinSF2	-0.01137812	0.041709055	-0.01572811	0.09711745	-0.099260316
## BsmtUnfSF	0.21447911	-0.035092241	0.16664332	0.31798744	0.004469092
## MasVnrArea	0.47261450	0.011928394	0.10277452	0.33985041	0.173800000
## YearBuilt	0.52289733	0.004949728	-0.07065122	0.28198586	0.010307660
## OverallQual	0.79098160	0.065165844	0.10167636	0.47622383	0.295492879
## OverallCond	-0.07785589	-0.001984942	0.01298006	-0.14420278	0.028942116
## LotArea	0.26384335	0.077672392	0.11968991	0.29947458	0.050985948
## BsmtFinSF1	BsmtFinSF1	BsmtFinSF2	BsmtUnfSF	MasVnrArea	YearBuilt
## SalePrice	0.38641981	-0.01137812	0.214479106	0.47261450	0.522897333
## PoolArea	0.14049129	0.04170905	-0.035092241	0.01192839	0.004949728
## BedroomAbvGr	-0.10735468	-0.01572811	0.166643317	0.10277452	-0.070651217

```

## X1stFlrSF      0.44586266  0.09711745  0.317987438  0.33985041  0.281985859
## X2ndFlrSF     -0.13707899 -0.09926032  0.004469092  0.17380000  0.010307660
## BsmtFinSF1    1.000000000 -0.05011740 -0.495251469  0.26125605  0.249503197
## BsmtFinSF2    -0.05011740  1.000000000 -0.209294492 -0.07132963 -0.049106831
## BsmtUnfSF     -0.49525147 -0.20929449  1.000000000  0.11386216  0.149040392
## MasVnrArea     0.26125605 -0.07132963  0.113862163  1.000000000  0.311600107
## YearBuilt      0.24950320 -0.04910683  0.149040392  0.31160011  1.000000000
## OverallQual    0.23966597 -0.05911869  0.308158927  0.40725212  0.572322769
## OverallCond   -0.04623086  0.04022917 -0.136840570 -0.12569363 -0.375983196
## LotArea        0.21410313  0.11116975 -0.002618360  0.10332051  0.014227652
## OverallQual   OverallCond   LotArea
## SalePrice      0.79098160 -0.077855894  0.26384335
## PoolArea       0.06516584 -0.001984942  0.07767239
## BedroomAbvGr   0.10167636  0.012980060  0.11968991
## X1stFlrSF      0.47622383 -0.144202784  0.29947458
## X2ndFlrSF      0.29549288  0.028942116  0.05098595
## BsmtFinSF1    0.23966597 -0.046230856  0.21410313
## BsmtFinSF2    -0.05911869  0.040229170  0.11116975
## BsmtUnfSF     0.30815893 -0.136840570 -0.00261836
## MasVnrArea     0.40725212 -0.125693634  0.10332051
## YearBuilt      0.57232277 -0.375983196  0.01422765
## OverallQual    1.000000000 -0.091932343  0.10580574
## OverallCond   -0.09193234  1.000000000 -0.00563627
## LotArea        0.10580574 -0.005636270  1.000000000

```

Spearman

```
cor(data[,c("SalePrice",names_quant)], method="spearman")
```

	SalePrice	PoolArea	BedroomAbvGr	X1stFlrSF	X2ndFlrSF
## SalePrice	1.000000000	0.058452997	0.234906718	0.57540784	0.293597988
## PoolArea	0.05845300	1.000000000	0.071734296	0.07055688	0.061375531
## BedroomAbvGr	0.23490672	0.071734296	1.000000000	0.14073931	0.510443305
## X1stFlrSF	0.57540784	0.070556883	0.140739309	1.000000000	-0.276218209
## X2ndFlrSF	0.29359799	0.061375531	0.510443305	-0.27621821	1.000000000
## BsmtFinSF1	0.30187120	0.057586481	-0.084163676	0.32347797	-0.191236145
## BsmtFinSF2	-0.03880613	0.068075666	0.009766952	0.06746145	-0.101563808
## BsmtUnfSF	0.18519663	-0.036809084	0.157728816	0.22365249	0.059774347
## MasVnrArea	0.41590613	0.005147833	0.112683907	0.34886253	0.062473205
## YearBuilt	0.65268155	0.008985989	-0.035256954	0.29336321	0.029715964
## OverallQual	0.80982859	0.056667277	0.121517075	0.40872967	0.289561043
## OverallCond	-0.12932495	-0.005604720	-0.003712820	-0.16668614	0.001110962
## LotArea	0.45646058	0.084459537	0.337787912	0.44385785	0.119356358
## BsmtFinSF1	BsmtFinSF1	BsmtFinSF2	BsmtUnfSF	MasVnrArea	YearBuilt
## SalePrice	0.30187120	-0.038806132	0.18519663	0.415906127	0.652681546
## PoolArea	0.05758648	0.068075666	-0.03680908	0.005147833	0.008985989
## BedroomAbvGr	-0.08416368	0.009766952	0.15772882	0.112683907	-0.035256954
## X1stFlrSF	0.32347797	0.067461453	0.22365249	0.348862526	0.293363207
## X2ndFlrSF	-0.19123615	-0.101563808	0.05977435	0.062473205	0.029715964
## BsmtFinSF1	1.000000000	0.050397851	-0.57363766	0.237540893	0.189644722
## BsmtFinSF2	0.05039785	1.000000000	-0.27100666	-0.059622456	-0.111692499
## BsmtUnfSF	-0.57363766	-0.271006655	1.000000000	0.074778703	0.139014491
## MasVnrArea	0.23754089	-0.059622456	0.07477870	1.000000000	0.395588511
## YearBuilt	0.18964472	-0.111692499	0.13901449	0.395588511	1.000000000
## OverallQual	0.13295687	-0.117560306	0.27293892	0.408135746	0.647391960

```

## OverallCond -0.01108688 0.102471152 -0.12827001 -0.175895332 -0.416963861
## LotArea 0.17199466 0.072018834 0.07782979 0.175908670 0.103384997
## OverallQual OverallCond LotArea
## SalePrice 0.80982859 -0.129324947 0.45646058
## PoolArea 0.05666728 -0.005604720 0.08445954
## BedroomAbvGr 0.12151707 -0.003712820 0.33778791
## X1stFlrSF 0.40872967 -0.166686140 0.44385785
## X2ndFlrSF 0.28956104 0.001110962 0.11935636
## BsmtFinSF1 0.13295687 -0.011086884 0.17199466
## BsmtFinSF2 -0.11756031 0.102471152 0.07201883
## BsmtUnfSF 0.27293892 -0.128270005 0.07782979
## MasVnrArea 0.40813575 -0.175895332 0.17590867
## YearBuilt 0.64739196 -0.416963861 0.10338500
## OverallQual 1.00000000 -0.177520658 0.23330333
## OverallCond -0.17752066 1.000000000 -0.04691151
## LotArea 0.23330333 -0.046911511 1.00000000

```

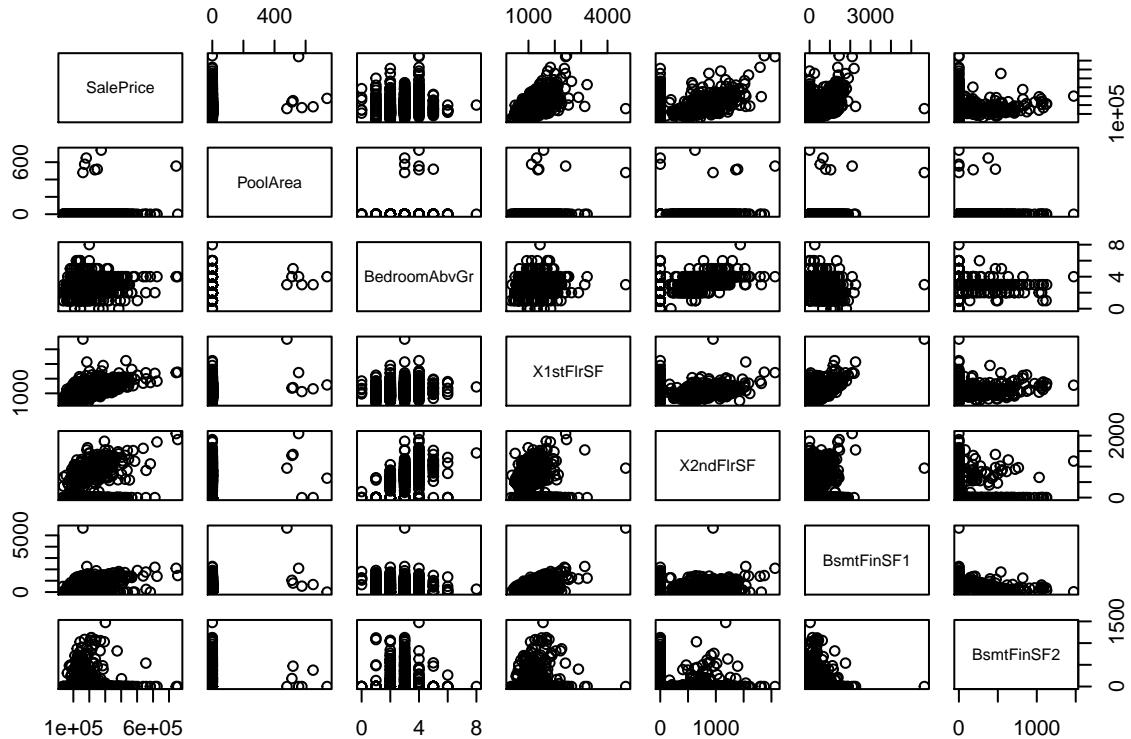
From the correlation matrixes, we can already see that OverallQual, YearBuilt, and X1stFlrSF are strongly correlated with our target variable. Furthermore, BsmtFinSF1-BsmtUnfSF, YearBuilt-OverallQual, BedroomAbvGr-X2ndFlrSF are highly correlated.

We can select : OverallQual, X1stFlrSF, MasVnrArea. As backup variables we could use : LotArea(*), **YearBuilt**(colinearity OverallQual).

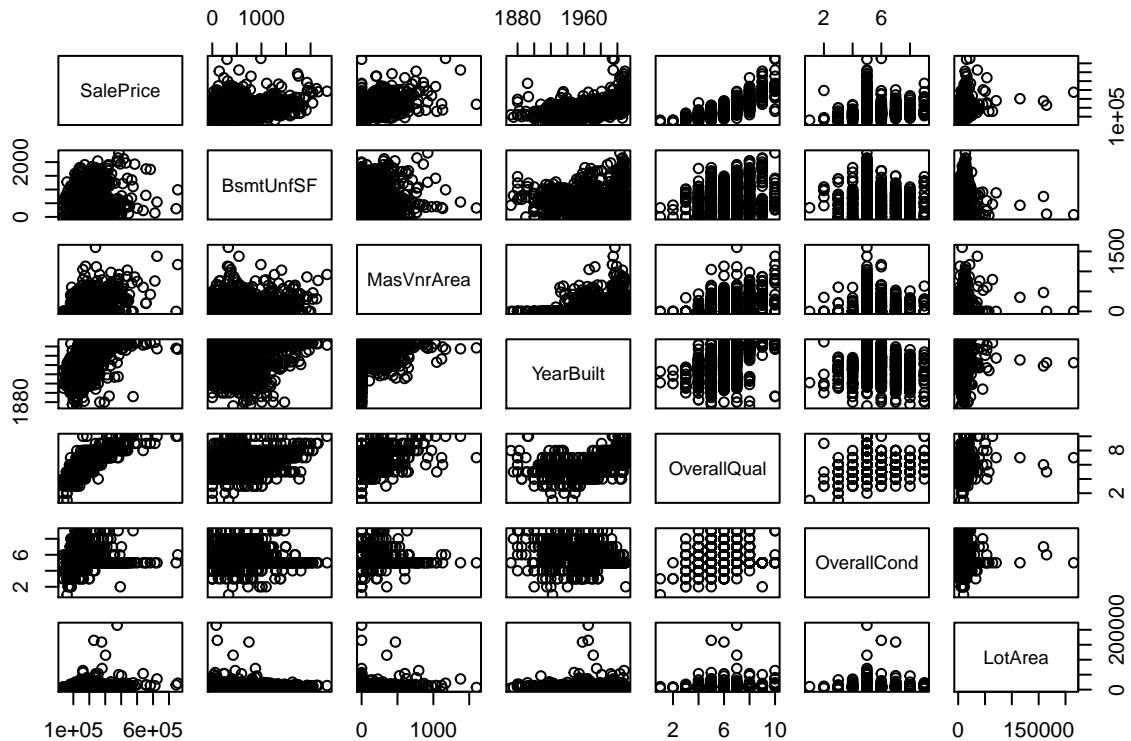
I add Yearbuilt because even if it is correlated with OverallQual, the correlation is not serious and might be handled.

Scatter plot

```
plot(data[,c("SalePrice",names_quant[1:6])])
```



```
plot(data[,c("SalePrice",names_quant[7:12])])
```



From the scatter plots above, we can see that OverallQual, Yearbuilt, BsmtUnfSF, BsmtFinSF2, X2ndFlrSF, have a clear linear relationship with the target varibale. We can also notice thatX1stFlrSF and BsmtUnfSF have a serious linear relationship.

Quanlitative variables analysis

Identify qualitative variables and convert them to dummy variables

```
#Names of quantitatives variables
names_qual <- colnames(data[,most][,which(sapply(data[,most],is.factor))])

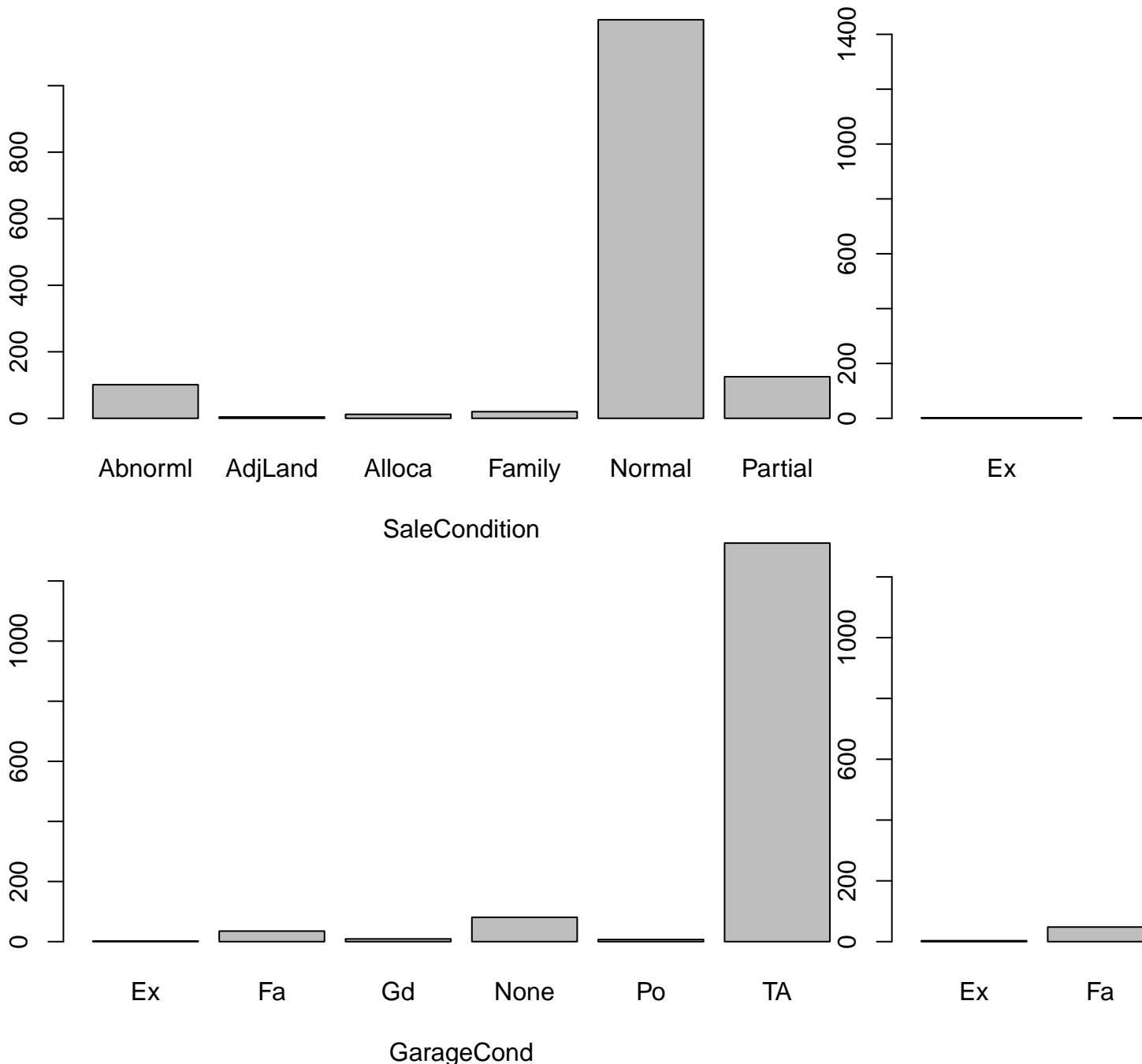
names_qual

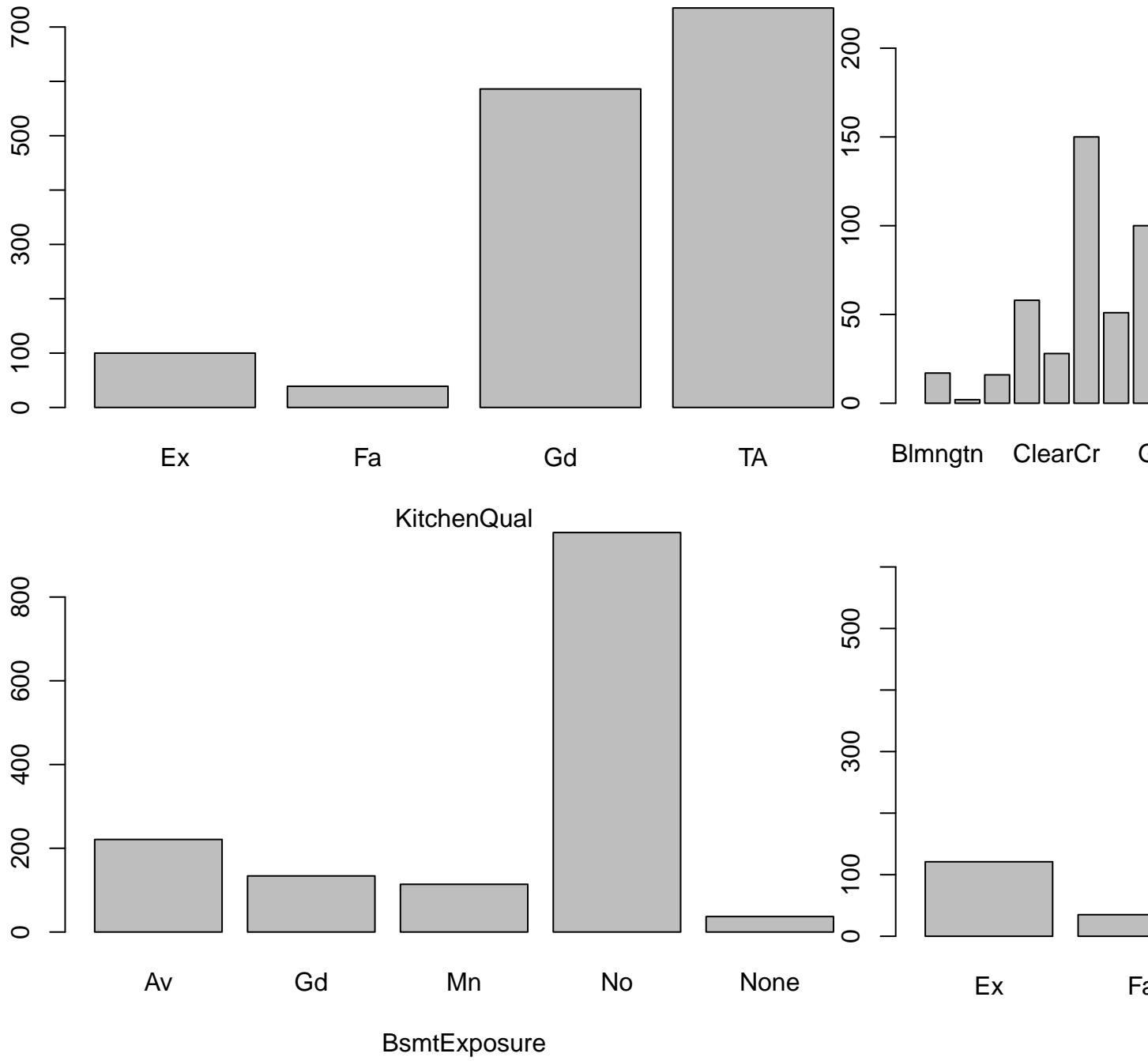
## [1] "SaleCondition" "PoolQC"          "GarageCond"      "GarageQual"
## [5] "KitchenQual"   "Neighborhood"    "BsmtExposure"   "BsmtQual"
## [9] "ExterQual"     "RoofMatl"        "Condition2"     "Condition1"
## [13] "LandSlope"

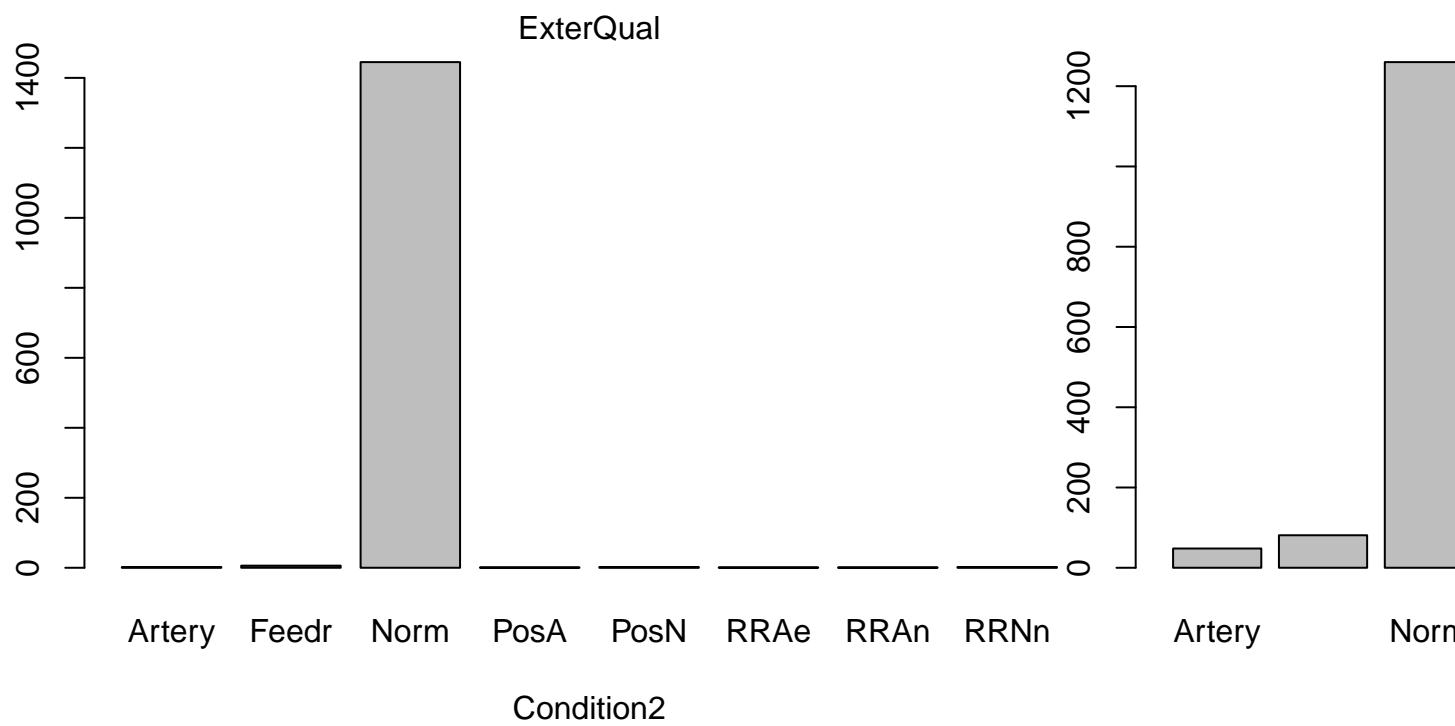
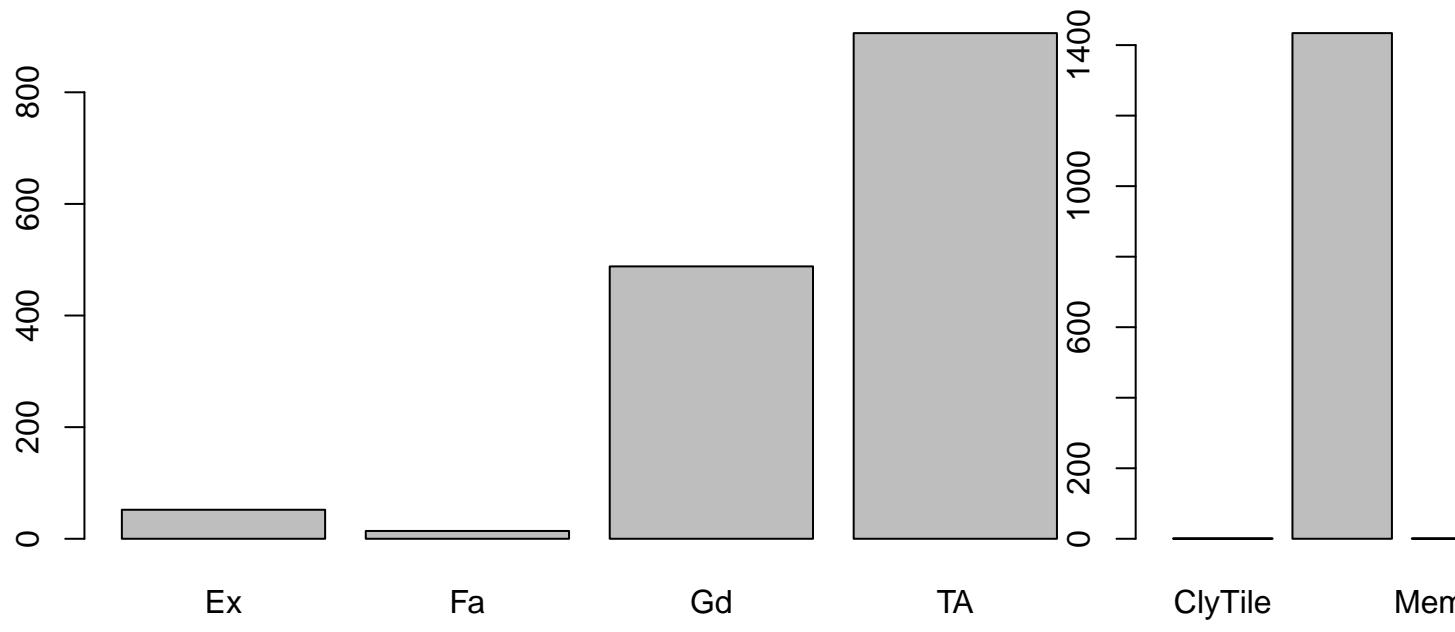
cat("We have ", length(names_qual), "quantitative variables")

## We have 13 quantitative variables

sapply(names_qual, FUN=function(x){
  count <- table(data[,x])
  barplot(count, xlab=x)
})
```









```
## $SaleCondition
```

```
## [,1]
## [1,] 0.7
## [2,] 1.9
## [3,] 3.1
## [4,] 4.3
## [5,] 5.5
## [6,] 6.7
```

```
##
```

```
## $PoolQC
```

```
## [,1]
## [1,] 0.7
## [2,] 1.9
## [3,] 3.1
## [4,] 4.3
```

```
##
```

```
## $GarageCond
```

```
## [,1]
## [1,] 0.7
## [2,] 1.9
## [3,] 3.1
## [4,] 4.3
## [5,] 5.5
## [6,] 6.7
```

```
##
```

```
## $GarageQual
```

```
## [,1]
## [1,] 0.7
## [2,] 1.9
## [3,] 3.1
## [4,] 4.3
## [5,] 5.5
```

```

## [6,] 6.7
##
## $KitchenQual
## [,1]
## [1,] 0.7
## [2,] 1.9
## [3,] 3.1
## [4,] 4.3
##
## $Neighborhood
## [,1]
## [1,] 0.7
## [2,] 1.9
## [3,] 3.1
## [4,] 4.3
## [5,] 5.5
## [6,] 6.7
## [7,] 7.9
## [8,] 9.1
## [9,] 10.3
## [10,] 11.5
## [11,] 12.7
## [12,] 13.9
## [13,] 15.1
## [14,] 16.3
## [15,] 17.5
## [16,] 18.7
## [17,] 19.9
## [18,] 21.1
## [19,] 22.3
## [20,] 23.5
## [21,] 24.7
## [22,] 25.9
## [23,] 27.1
## [24,] 28.3
## [25,] 29.5
##
## $BsmtExposure
## [,1]
## [1,] 0.7
## [2,] 1.9
## [3,] 3.1
## [4,] 4.3
## [5,] 5.5
##
## $BsmtQual
## [,1]
## [1,] 0.7
## [2,] 1.9
## [3,] 3.1
## [4,] 4.3
## [5,] 5.5
##
## $ExterQual

```

```

##      [,1]
## [1,] 0.7
## [2,] 1.9
## [3,] 3.1
## [4,] 4.3
##
## $RoofMat1
##      [,1]
## [1,] 0.7
## [2,] 1.9
## [3,] 3.1
## [4,] 4.3
## [5,] 5.5
## [6,] 6.7
## [7,] 7.9
## [8,] 9.1
##
## $Condition2
##      [,1]
## [1,] 0.7
## [2,] 1.9
## [3,] 3.1
## [4,] 4.3
## [5,] 5.5
## [6,] 6.7
## [7,] 7.9
## [8,] 9.1
##
## $Condition1
##      [,1]
## [1,] 0.7
## [2,] 1.9
## [3,] 3.1
## [4,] 4.3
## [5,] 5.5
## [6,] 6.7
## [7,] 7.9
## [8,] 9.1
## [9,] 10.3
##
## $LandSlope
##      [,1]
## [1,] 0.7
## [2,] 1.9
## [3,] 3.1

```

Convert ordinal variables to numerical variables

```

#best<-regsubsets(x=data[,c(1:4)], y=data$SalePrice, nbest=1, numax=4, method="exhaustive")
# PoolQC

table(data[, "PoolQC"])

##
##   Ex   Fa   Gd None

```

```

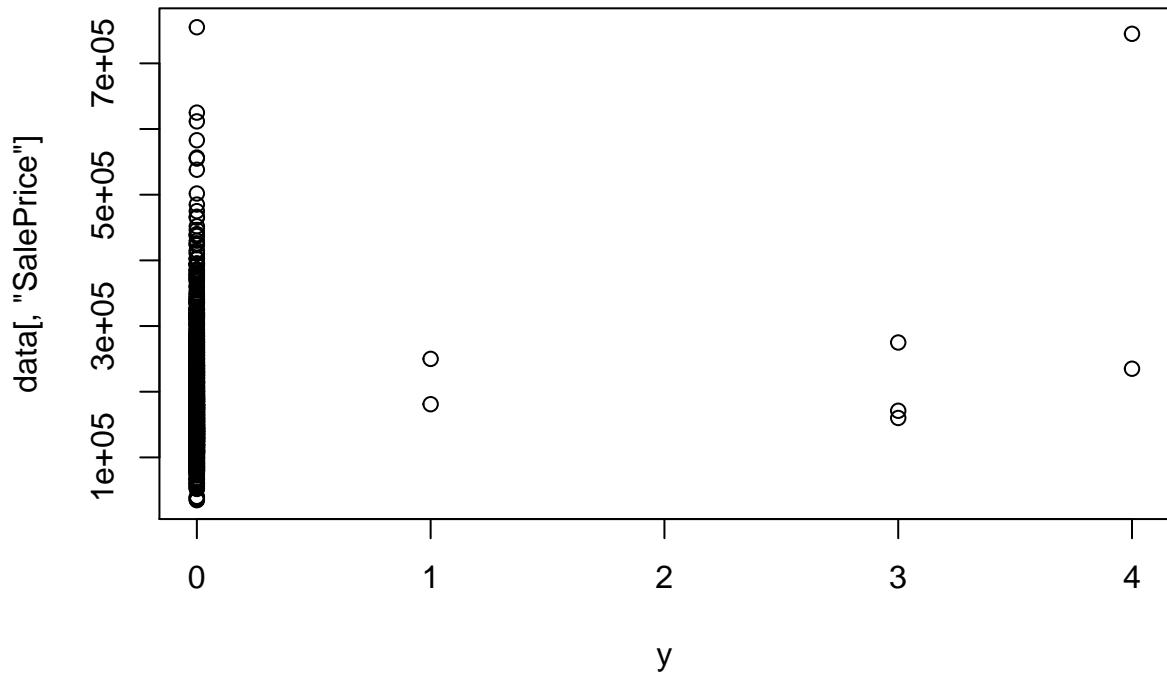
##      2      2      3 1453
y <- as.character(data[, "PoolQC"])
y <- replace(y, y=='None', values = 0)
y <- replace(y, y=='Fa', values = 1)
y <- replace(y, y=='TA', values = 2)
y <- replace(y, y=='Gd', values = 3)
y <- replace(y, y=='Ex', values = 4)
y <- as.numeric(y)

cor(data[, "SalePrice"], y)

## [1] 0.1154843
cor(data[, "SalePrice"], y, method = "spearman")

## [1] 0.05846869
plot(y, data[, "SalePrice"])

```



```

#GarageCond
table(data[, "GarageCond"])

```

```

##
##      Ex     Fa     Gd None     Po     TA
##      2     35      9    81      7   1326
y <- as.character(data[, "GarageCond"])
y <- replace(y, y=='None', values = 0)
y <- replace(y, y=='Po', values = 1)
y <- replace(y, y=='Fa', values = 2)
y <- replace(y, y=='TA', values = 3)
y <- replace(y, y=='Gd', values = 4)
y <- replace(y, y=='Ex', values = 5)

```

```

y <- as.numeric(y)

gc <- y

cor(data[, "SalePrice"], y)

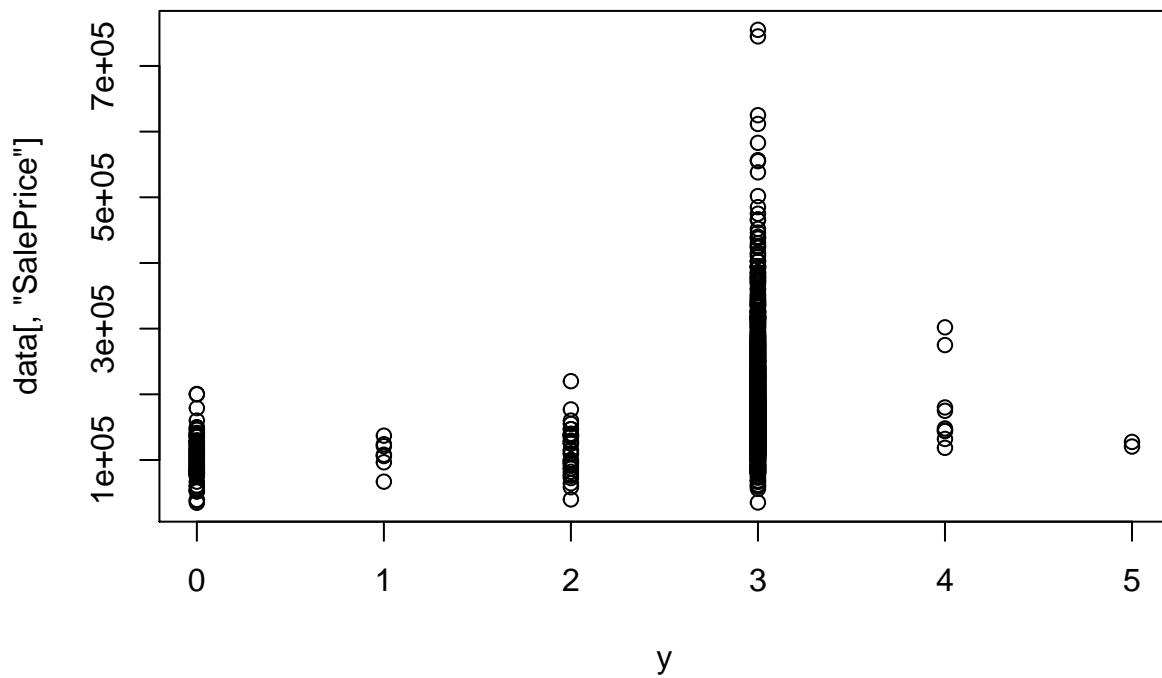
## [1] 0.2631908

cor(data[, "SalePrice"], y, method = "spearman")

## [1] 0.3390149

plot(y, data[, "SalePrice"])

```



```

#GarageQual

table(data[, "GarageQual"])

##          Ex      Fa      Gd    None      Po      TA
##        3     48     14     81      3 1311

y <- as.character(data[, "GarageQual"])
y <- replace(y, y=='None', values = 0)
y <- replace(y, y=='Po', values = 1)
y <- replace(y, y=='Fa', values = 2)
y <- replace(y, y=='TA', values = 3)
y <- replace(y, y=='Gd', values = 4)
y <- replace(y, y=='Ex', values = 5)
y <- as.numeric(y)

gq <- y
cor(data[, "SalePrice"], y)

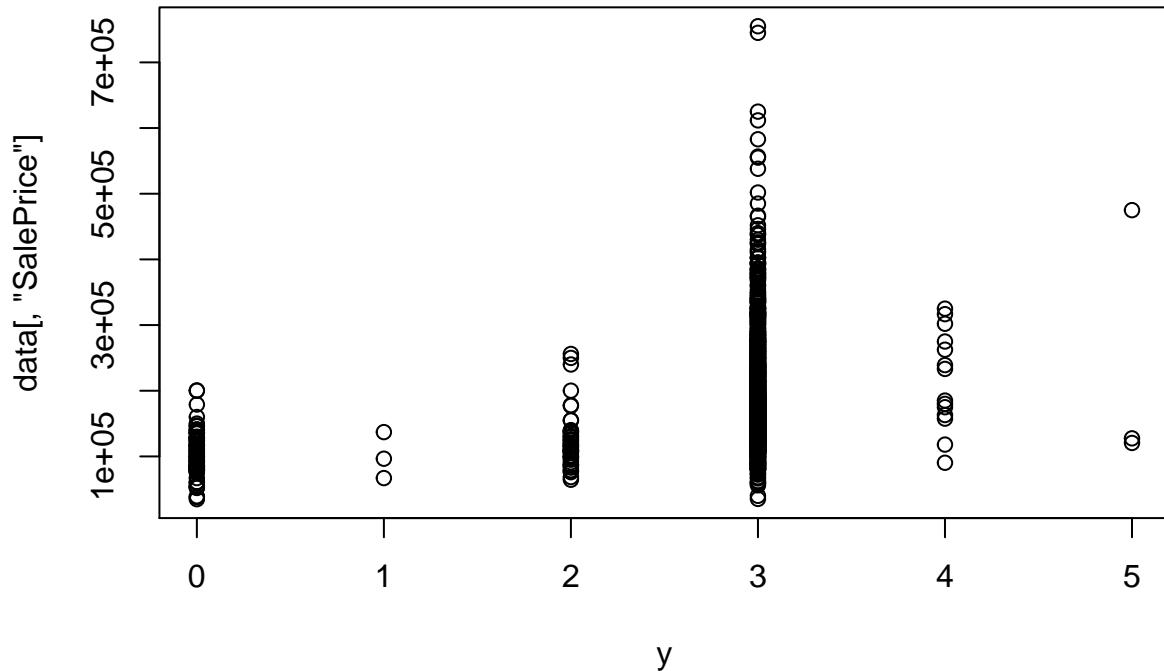
## [1] 0.2738391

```

```

cor(data[, "SalePrice"], y, method = "spearman")
## [1] 0.3510816
plot(y, data[, "SalePrice"])

```



```

#GarageCond vs GarageQual
cor(gc,gq)

## [1] 0.9591716
#KitchenQual

table(data[, "KitchenQual"])

##
##   Ex   Fa   Gd   TA
## 100   39  586  735

y <- as.character(data[, "KitchenQual"])
y <- replace(y, y=='None', values = 0)
y <- replace(y, y=='Po', values = 1)
y <- replace(y, y=='Fa', values = 2)
y <- replace(y, y=='TA', values = 3)
y <- replace(y, y=='Gd', values = 4)
y <- replace(y, y=='Ex', values = 5)
y <- as.numeric(y)

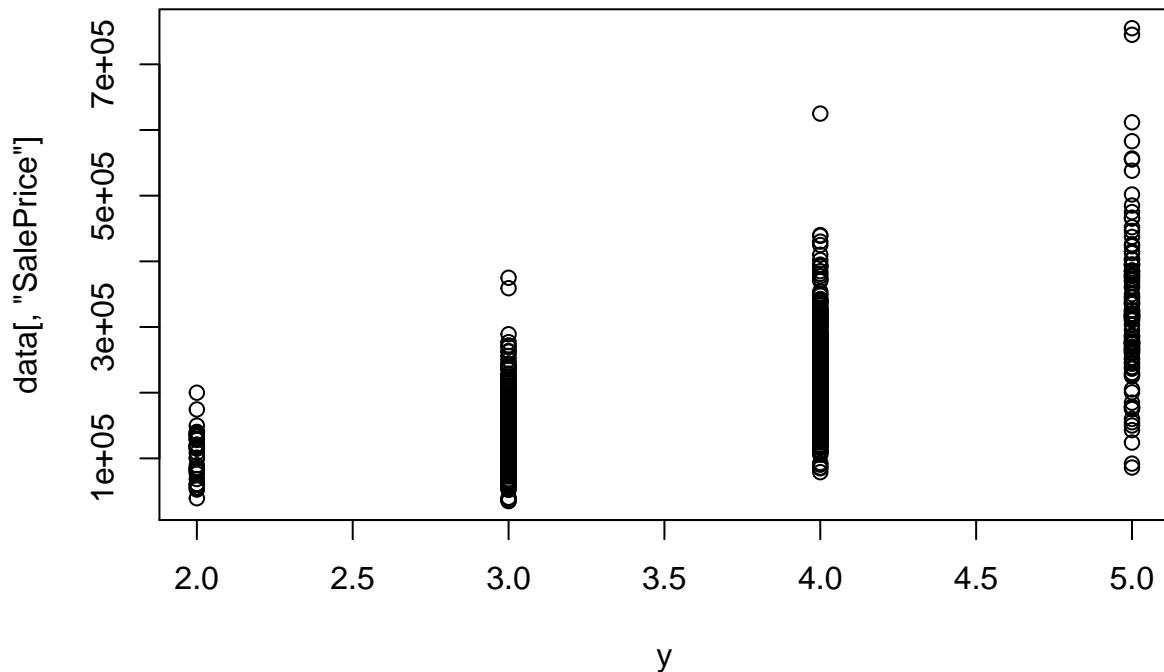
KQ <- y
cor(data[, "SalePrice"], y)

## [1] 0.6595997
cor(data[, "SalePrice"], y, method = "spearman")

## [1] 0.6728485

```

```
plot(y, data[, "SalePrice"])
```



```
#BsmtExposure
```

```
table(data[, "BsmtExposure"])
```

```
##  
##   Av    Gd    Mn    No None  
##  221   134   114   954    37
```

```
y <- as.character(data[, "BsmtExposure"])  
y <- replace(y, y=='None', values = 0)  
y <- replace(y, y=='No', values = 1)  
y <- replace(y, y=='Mn', values = 2)  
y <- replace(y, y=='Av', values = 3)  
y <- replace(y, y=='Gd', values = 4)
```

```
y <- as.numeric(y)
```

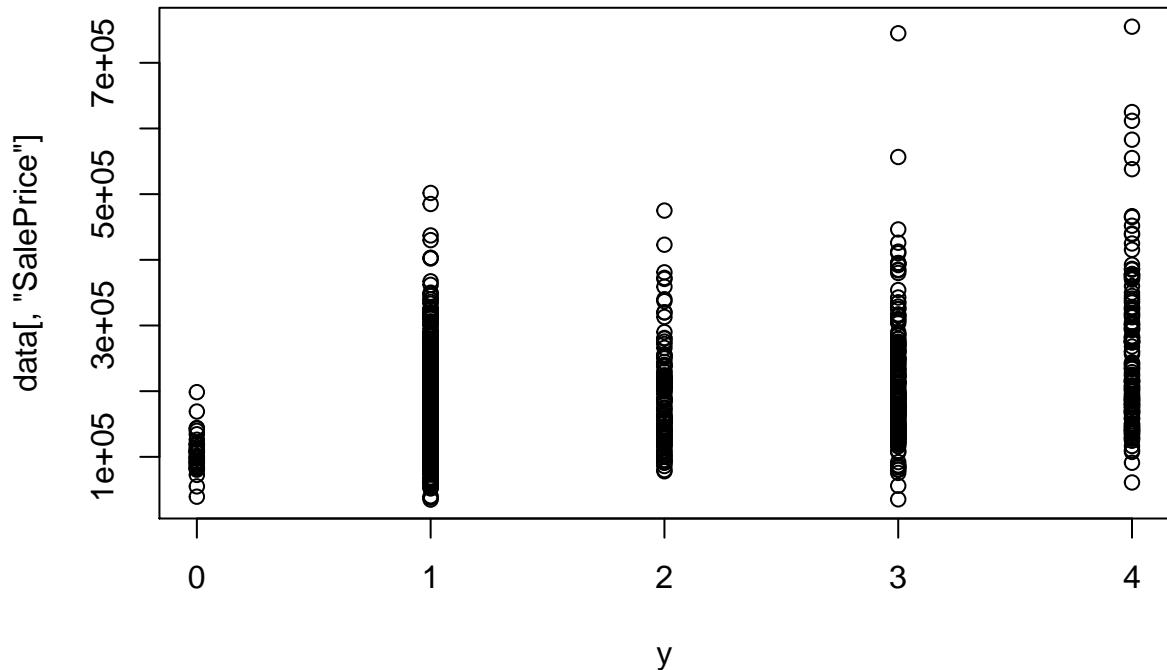
```
BE <- y  
cor(data[, "SalePrice"], y)
```

```
## [1] 0.375045
```

```
cor(data[, "SalePrice"], y, method = "spearman")
```

```
## [1] 0.3451941
```

```
plot(y, data[, "SalePrice"])
```

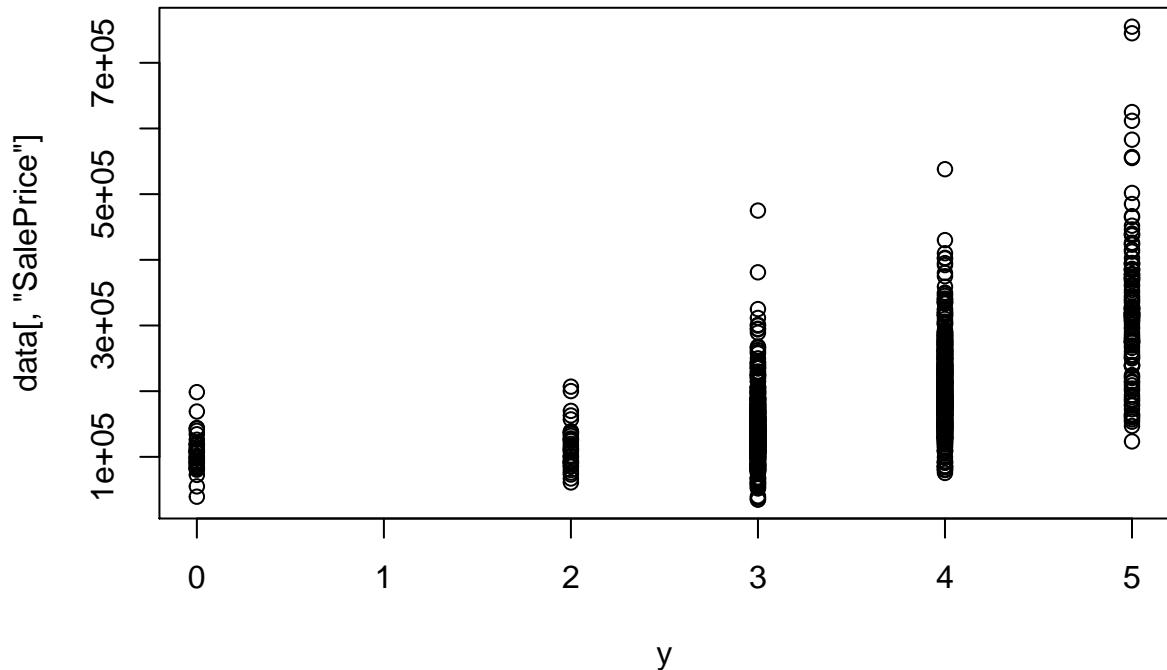


```
#BsmtQual





```



```
#BsmtQual vs BsmtExposure
cor(BE, BQ)

## [1] 0.3999856
#ExterQual

table(data[, "ExterQual"])

##
##   Ex Fa Gd TA
##   52 14 488 906

y <- as.character(data[, "ExterQual"])

y <- replace(y, y=='Po', values = 0)
y <- replace(y, y=='Fa', values = 1)
y <- replace(y, y=='TA', values = 2)
y <- replace(y, y=='Gd', values = 3)
y <- replace(y, y=='Ex', values = 4)

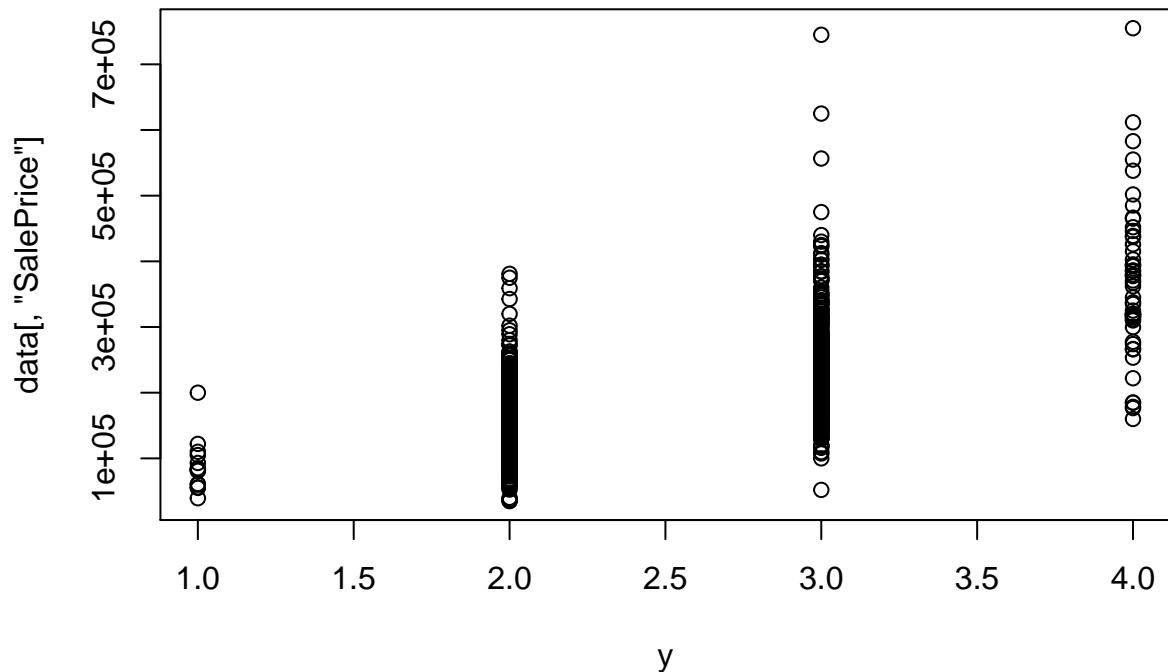
y <- as.numeric(y)

EQ <- y
cor(data[, "SalePrice"], y)

## [1] 0.6826392
cor(data[, "SalePrice"], y, method = "spearman")

## [1] 0.6840138
```

```
plot(y, data[, "SalePrice"])
```



```
#LandSlope
```

```
table(data[, "LandSlope"])
```

```
##  
##   Gtl  Mod  Sev  
## 1382    65    13
```

```
y <- as.character(data[, "LandSlope"])
```

```
y <- replace(y, y=='Gtl', values = 0)  
y <- replace(y, y=='Mod', values = 1)  
y <- replace(y, y=='Sev', values = 2)
```

```
y <- as.numeric(y)
```

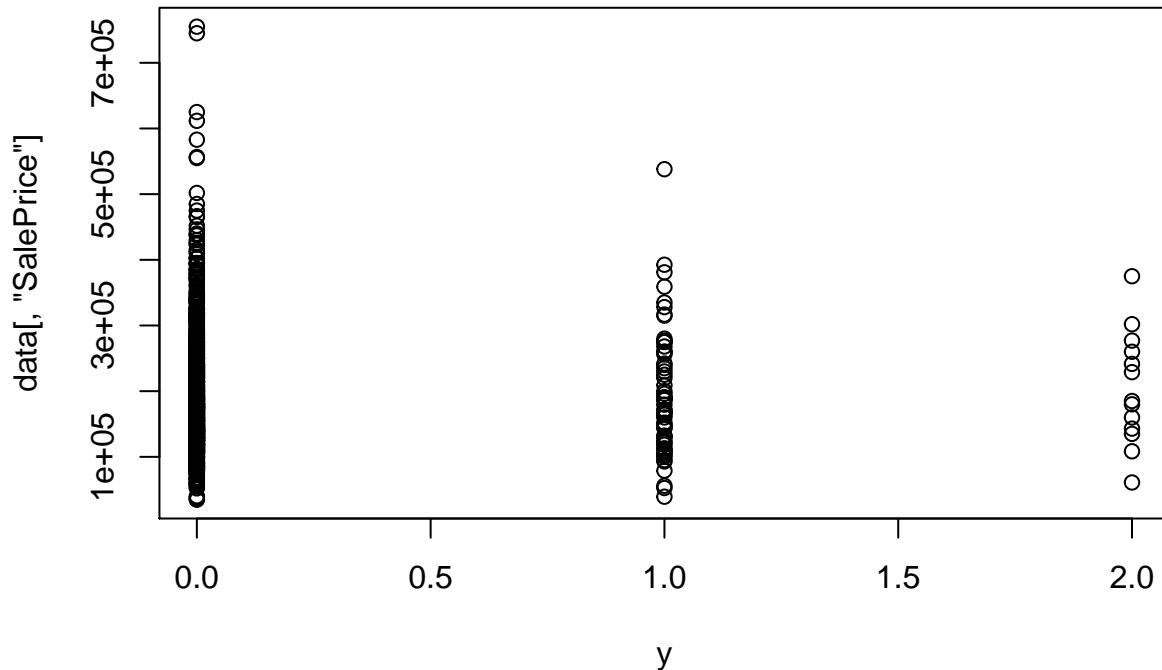
```
cor(data[, "SalePrice"], y)
```

```
## [1] 0.05115225
```

```
cor(data[, "SalePrice"], y, method = "spearman")
```

```
## [1] 0.05031026
```

```
plot(y, data[, "SalePrice"])
```



```
# ExterQual vs BsmtQual
cor(EQ,BQ)
```

```
## [1] 0.5655581
```

```
# KitchenQual vs ExterQual
cor(KQ, EQ)
```

```
## [1] 0.7161222
```

```
# BsmtQual vs KitchenQual
cor(KQ, BQ)
```

```
## [1] 0.510938
```

From the plots above, we can see that there are three ordinal variables that are strongly correlated to the SalePrice target : ExterQual, KitchenQual and BsmtQual. However, those three predictors are highly correlated to each other.

In conclusion, based on collinearity and correlation, we can select ExterQual, RoofMatl. We should also consider the following qualitative variables as backup variables : SaleCondition(* categorical), PoolQC(), Neighborhood(categorical), BsmtExposure(), **GarageQual()**, condition1(), condition2(*) .

I did a second screen at the predictors variables for the low and medium significant variables. I observe an interesting fact, not all significant variables are highly correlated with the target variable. Let's take PoolArea for instance. We can notice that it is not linearly related to the target variable but it is significant. So I decide to keep those variables in a different list for further tests. Maybe those variables will require to take their quadratic forms or other transformation to get their full contribution.

Hence, we select : LotArea, PoolArea, BedroomAbvGr, KitchenAbvGr, ScreenPorch, PoolArea, Street

```
#Names of quantitatives variables
```

```
med <- c("BedroomAbvGr", "KitchenAbvGr", "ScreenPorch", "PoolArea", "Street")
names_ <- colnames(data[, med][which(sapply(data[,med],is.numeric))])
```

```
names_
```

```

## [1] "BedroomAbvGr" "KitchenAbvGr" "ScreenPorch"  "PoolArea"
cat("We have ", length(names_), "quantitative variables")

## We have 4 quantitative variables
cor(data[,c("SalePrice", names_)])

```

	SalePrice	BedroomAbvGr	KitchenAbvGr	ScreenPorch	PoolArea
## SalePrice	1.00000000	0.16821315	-0.13590737	0.11144657	0.09240355
## BedroomAbvGr	0.16821315	1.00000000	0.19859676	0.04429969	0.07070258
## KitchenAbvGr	-0.13590737	0.19859676	1.00000000	-0.05161337	-0.01452512
## ScreenPorch	0.11144657	0.04429969	-0.05161337	1.00000000	0.05130739
## PoolArea	0.09240355	0.07070258	-0.01452512	0.05130739	1.00000000

We could also create variables for the most significant dummy variables of a qualitative predicator.

So overall, we could start working with the 10 predicators variables : OverallQual, X1stFlrSF, MasVnrArea, ExterQual, Roof-Matl, LotArea, PoolArea, BsmtExposure, Neighborhood, Garage-Qual.