

# Data Analysis - Ames House Prices

Ian Vetter

2023-07-20

## The Dataset

```
housing_data = read.csv("C:\\Users\\ianve\\Desktop\\data_analysis_proj\\dataset\\AmesHousing.csv")  
  
summary(housing_data)
```

```

##      Order      PID      MS.SubClass      MS.Zoning
## Min.    : 1.0    Min.    :5.263e+08  Min.    : 20.00  Length:2930
## 1st Qu.: 733.2   1st Qu.:5.285e+08  1st Qu.: 20.00  Class :character
## Median :1465.5   Median :5.355e+08  Median : 50.00  Mode  :character
## Mean    :1465.5   Mean    :7.145e+08  Mean    : 57.39
## 3rd Qu.:2197.8   3rd Qu.:9.072e+08  3rd Qu.: 70.00
## Max.    :2930.0   Max.    :1.007e+09  Max.    :190.00
##
##      Lot.Frontage      Lot.Area      Street      Alley
## Min.    : 21.00      Min.    : 1300  Length:2930  Length:2930
## 1st Qu.: 58.00      1st Qu.: 7440  Class :character  Class :character
## Median : 68.00      Median : 9436  Mode  :character  Mode  :character
## Mean    : 69.22      Mean    :10148
## 3rd Qu.: 80.00      3rd Qu.:11555
## Max.    :313.00      Max.    :215245
## NA's    :490
##      Lot.Shape      Land.Contour      Utilities      Lot.Config
## Length:2930      Length:2930      Length:2930      Length:2930
## Class :character  Class :character  Class :character  Class :character
## Mode  :character  Mode  :character  Mode  :character  Mode  :character
##
##
##
##      Land.Slope      Neighborhood      Condition.1      Condition.2
## Length:2930      Length:2930      Length:2930      Length:2930
## Class :character  Class :character  Class :character  Class :character
## Mode  :character  Mode  :character  Mode  :character  Mode  :character
##
##
##
##      Bldg.Type      House.Style      Overall.Qual      Overall.Cond
## Length:2930      Length:2930      Min.    : 1.000  Min.    :1.000
## Class :character  Class :character  1st Qu.: 5.000  1st Qu.:5.000
## Mode  :character  Mode  :character  Median : 6.000  Median :5.000
##                                     Mean    : 6.095  Mean    :5.563
##                                     3rd Qu.: 7.000  3rd Qu.:6.000
##                                     Max.    :10.000  Max.    :9.000
##
##      Year.Built      Year.Remod.Add      Roof.Style      Roof.Mat1
## Min.    :1872      Min.    :1950  Length:2930  Length:2930
## 1st Qu.:1954      1st Qu.:1965  Class :character  Class :character
## Median :1973      Median :1993  Mode  :character  Mode  :character
## Mean    :1971      Mean    :1984
## 3rd Qu.:2001      3rd Qu.:2004
## Max.    :2010      Max.    :2010
##
##      Exterior.1st      Exterior.2nd      Mas.Vnr.Type      Mas.Vnr.Area
## Length:2930      Length:2930      Length:2930      Min.    : 0.0
## Class :character  Class :character  Class :character  1st Qu.: 0.0
## Mode  :character  Mode  :character  Mode  :character  Median : 0.0

```

```

##                                     Mean   : 101.9
##                                     3rd Qu.: 164.0
##                                     Max.   :1600.0
##                                     NA's   :23
##   Exter.Qual      Exter.Cond      Foundation      Bsm't.Qual
## Length:2930      Length:2930      Length:2930      Length:2930
## Class :character  Class :character  Class :character  Class :character
## Mode  :character  Mode  :character  Mode  :character  Mode  :character
##
##
##
##   Bsm't.Cond      Bsm't.Exposure      Bsm'tFin.Type.1      Bsm'tFin.SF.1
## Length:2930      Length:2930      Length:2930      Min.   :  0.0
## Class :character  Class :character  Class :character  1st Qu.:  0.0
## Mode  :character  Mode  :character  Mode  :character  Median : 370.0
##                                     Mean   : 442.6
##                                     3rd Qu.: 734.0
##                                     Max.   :5644.0
##                                     NA's   :1
##   Bsm'tFin.Type.2      Bsm'tFin.SF.2      Bsm't.Unf.SF      Total.Bsm't.SF
## Length:2930      Min.   :  0.00      Min.   :  0.0      Min.   :  0
## Class :character  1st Qu.:  0.00      1st Qu.: 219.0      1st Qu.: 793
## Mode  :character  Median :  0.00      Median : 466.0      Median : 990
##                                     Mean   : 49.72      Mean   : 559.3      Mean   :1052
##                                     3rd Qu.:  0.00      3rd Qu.: 802.0      3rd Qu.:1302
##                                     Max.   :1526.00      Max.   :2336.0      Max.   :6110
##                                     NA's   :1          NA's   :1          NA's   :1
##   Heating      Heating.QC      Central.Air      Electrical
## Length:2930      Length:2930      Length:2930      Length:2930
## Class :character  Class :character  Class :character  Class :character
## Mode  :character  Mode  :character  Mode  :character  Mode  :character
##
##
##
##   X1st.Flr.SF      X2nd.Flr.SF      Low.Qual.Fin.SF      Gr.Liv.Area
## Min.   : 334.0      Min.   :  0.0      Min.   :  0.000      Min.   : 334
## 1st Qu.: 876.2      1st Qu.:  0.0      1st Qu.:  0.000      1st Qu.:1126
## Median :1084.0      Median :  0.0      Median :  0.000      Median :1442
## Mean   :1159.6      Mean   : 335.5      Mean   :  4.677      Mean   :1500
## 3rd Qu.:1384.0      3rd Qu.: 703.8      3rd Qu.:  0.000      3rd Qu.:1743
## Max.   :5095.0      Max.   :2065.0      Max.   :1064.000      Max.   :5642
##
##   Bsm't.Full.Bath      Bsm't.Half.Bath      Full.Bath      Half.Bath
## Min.   :0.0000      Min.   :0.00000      Min.   :0.000      Min.   :0.0000
## 1st Qu.:0.0000      1st Qu.:0.00000      1st Qu.:1.000      1st Qu.:0.0000
## Median :0.0000      Median :0.00000      Median :2.000      Median :0.0000
## Mean   :0.4314      Mean   :0.06113      Mean   :1.567      Mean   :0.3795
## 3rd Qu.:1.0000      3rd Qu.:0.00000      3rd Qu.:2.000      3rd Qu.:1.0000
## Max.   :3.0000      Max.   :2.00000      Max.   :4.000      Max.   :2.0000
## NA's   :2          NA's   :2

```

```

## Bedroom.AbvGr Kitchen.AbvGr Kitchen.Qual TotRms.AbvGr
## Min. :0.000 Min. :0.000 Length:2930 Min. : 2.000
## 1st Qu.:2.000 1st Qu.:1.000 Class :character 1st Qu.: 5.000
## Median :3.000 Median :1.000 Mode :character Median : 6.000
## Mean :2.854 Mean :1.044 Mean : 6.443
## 3rd Qu.:3.000 3rd Qu.:1.000 3rd Qu.: 7.000
## Max. :8.000 Max. :3.000 Max. :15.000
##
## Functional Fireplaces Fireplace.Qu Garage.Type
## Length:2930 Min. :0.0000 Length:2930 Length:2930
## Class :character 1st Qu.:0.0000 Class :character Class :character
## Mode :character Median :1.0000 Mode :character Mode :character
## Mean :0.5993
## 3rd Qu.:1.0000
## Max. :4.0000
##
## Garage.Yr.Blt Garage.Finish Garage.Cars Garage.Area
## Min. :1895 Length:2930 Min. :0.000 Min. : 0.0
## 1st Qu.:1960 Class :character 1st Qu.:1.000 1st Qu.: 320.0
## Median :1979 Mode :character Median :2.000 Median : 480.0
## Mean :1978 Mean :1.767 Mean : 472.8
## 3rd Qu.:2002 3rd Qu.:2.000 3rd Qu.: 576.0
## Max. :2207 Max. :5.000 Max. :1488.0
## NA's :159 NA's :1 NA's :1
## Garage.Qual Garage.Cond Paved.Drive Wood.Deck.SF
## Length:2930 Length:2930 Length:2930 Min. : 0.00
## Class :character Class :character Class :character 1st Qu.: 0.00
## Mode :character Mode :character Mode :character Median : 0.00
## Mean : 93.75
## 3rd Qu.: 168.00
## Max. :1424.00
##
## Open.Porch.SF Enclosed.Porch X3Ssn.Porch Screen.Porch
## Min. : 0.00 Min. : 0.00 Min. : 0.000 Min. : 0
## 1st Qu.: 0.00 1st Qu.: 0.00 1st Qu.: 0.000 1st Qu.: 0
## Median : 27.00 Median : 0.00 Median : 0.000 Median : 0
## Mean : 47.53 Mean : 23.01 Mean : 2.592 Mean : 16
## 3rd Qu.: 70.00 3rd Qu.: 0.00 3rd Qu.: 0.000 3rd Qu.: 0
## Max. :742.00 Max. :1012.00 Max. :508.000 Max. :576
##
## Pool.Area Pool.QC Fence Misc.Feature
## Min. : 0.000 Length:2930 Length:2930 Length:2930
## 1st Qu.: 0.000 Class :character Class :character Class :character
## Median : 0.000 Mode :character Mode :character Mode :character
## Mean : 2.243
## 3rd Qu.: 0.000
## Max. :800.000
##
## Misc.Val Mo.Sold Yr.Sold Sale.Type
## Min. : 0.00 Min. : 1.000 Min. :2006 Length:2930
## 1st Qu.: 0.00 1st Qu.: 4.000 1st Qu.:2007 Class :character
## Median : 0.00 Median : 6.000 Median :2008 Mode :character

```

```
## Mean : 50.63 Mean : 6.216 Mean :2008
## 3rd Qu.: 0.00 3rd Qu.: 8.000 3rd Qu.:2009
## Max. :17000.00 Max. :12.000 Max. :2010
##
## Sale.Condition SalePrice
## Length:2930 Min. : 12789
## Class :character 1st Qu.:129500
## Mode :character Median :160000
## Mean :180796
## 3rd Qu.:213500
## Max. :755000
##
```

```
nrow(housing_data)
```

```
## [1] 2930
```

```
ncol(housing_data)
```

```
## [1] 82
```

First few examples:

```
housing_data$SalePrice[1:10]
```

```
## [1] 215000 105000 172000 244000 189900 195500 213500 191500 236500 189000
```

```
housing_data$Lot.Area[1:10]
```

```
## [1] 31770 11622 14267 11160 13830 9978 4920 5005 5389 7500
```

```
housing_data$Utilities[1:10]
```

```
## [1] "AllPub" "AllPub" "AllPub" "AllPub" "AllPub" "AllPub" "AllPub" "AllPub"
## [9] "AllPub" "AllPub"
```

## Basic Regression Models

```
sapply(lapply(housing_data, unique), length)
```

##	Order	PID	MS.SubClass	MS.Zoning	Lot.Frontage
##	2930	2930	16	7	129
##	Lot.Area	Street	Alley	Lot.Shape	Land.Contour
##	1960	2	3	4	4
##	Utilities	Lot.Config	Land.Slope	Neighborhood	Condition.1
##	3	5	3	28	9
##	Condition.2	Bldg.Type	House.Style	Overall.Qual	Overall.Cond
##	8	5	8	10	9
##	Year.Built	Year.Remod.Add	Roof.Style	Roof.Matl	Exterior.1st
##	118	61	6	8	16
##	Exterior.2nd	Mas.Vnr.Type	Mas.Vnr.Area	Exter.Qual	Exter.Cond
##	17	6	446	4	5
##	Foundation	Bsmt.Qual	Bsmt.Cond	Bsmt.Exposure	BsmtFin.Type.1
##	6	7	7	6	8
##	BsmtFin.SF.1	BsmtFin.Type.2	BsmtFin.SF.2	Bsmt.Unf.SF	Total.Bsmt.SF
##	996	8	275	1138	1059
##	Heating	Heating.QC	Central.Air	Electrical	X1st.Flr.SF
##	6	5	2	6	1083
##	X2nd.Flr.SF	Low.Qual.Fin.SF	Gr.Liv.Area	Bsmt.Full.Bath	Bsmt.Half.Bath
##	635	36	1292	5	4
##	Full.Bath	Half.Bath	Bedroom.AbvGr	Kitchen.AbvGr	Kitchen.Qual
##	5	3	8	4	5
##	TotRms.AbvGrd	Functional	Fireplaces	Fireplace.Qu	Garage.Type
##	14	8	5	6	7
##	Garage.Yr.Blt	Garage.Finish	Garage.Cars	Garage.Area	Garage.Qual
##	104	5	7	604	7
##	Garage.Cond	Paved.Drive	Wood.Deck.SF	Open.Porch.SF	Enclosed.Porch
##	7	3	380	252	183
##	X3Ssn.Porch	Screen.Porch	Pool.Area	Pool.QC	Fence
##	31	121	14	5	5
##	Misc.Feature	Misc.Val	Mo.Sold	Yr.Sold	Sale.Type
##	6	38	12	5	10
##	Sale.Condition	SalePrice			
##	6	1032			

*# lm() complains when it runs into "NA" values in dataframe, so just replacing any with 0 for now...*

```
housing_data[is.na(housing_data)] <- 0
```

```
full_additive = lm(SalePrice ~ ., data = housing_data)
summary(full_additive)
```

```
##
## Call:
## lm(formula = SalePrice ~ ., data = housing_data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -295016   -9412     251    9049   145976
##
## Coefficients: (13 not defined because of singularities)
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)    3.228e+06  7.730e+06   0.418 0.676257
## Order          -2.673e+00  6.099e+00  -0.438 0.661254
## PID             1.176e-05  7.583e-06   1.551 0.121065
## MS.SubClass    -6.378e+01  5.004e+01  -1.275 0.202593
## MS.ZoningC (all)  8.692e+03  3.045e+04   0.285 0.775285
## MS.ZoningFV     1.807e+04  2.999e+04   0.603 0.546821
## MS.ZoningI (all)  3.379e+04  3.575e+04   0.945 0.344658
## MS.ZoningRH     2.408e+04  3.052e+04   0.789 0.430275
## MS.ZoningRL     2.019e+04  2.974e+04   0.679 0.497142
## MS.ZoningRM     1.277e+04  2.985e+04   0.428 0.668852
## Lot.Frontage    1.466e+01  1.502e+01   0.976 0.329127
## Lot.Area        5.969e-01  7.965e-02   7.494 9.08e-14 ***
## StreetPave      1.996e+04  7.518e+03   2.655 0.007975 **
## AlleyGrv1       8.764e+02  2.554e+03   0.343 0.731549
## AlleyPave      -1.363e+03  3.133e+03  -0.435 0.663562
## Lot.ShapeIR2     3.758e+03  2.771e+03   1.356 0.175251
## Lot.ShapeIR3     1.693e+03  5.972e+03   0.284 0.776795
## Lot.ShapeReg     1.182e+03  1.072e+03   1.103 0.270234
## Land.ContourHLS   8.342e+03  3.251e+03   2.566 0.010353 *
## Land.ContourLow  -6.058e+03  4.224e+03  -1.434 0.151702
## Land.ContourLvl   4.399e+03  2.402e+03   1.832 0.067129 .
## UtilitiesNoSeWa  -2.173e+04  2.306e+04  -0.942 0.346256
## UtilitiesNoSewr  -2.251e+04  1.883e+04  -1.196 0.231928
## Lot.ConfigCulDSac  4.959e+03  2.144e+03   2.313 0.020793 *
## Lot.ConfigFR2    -4.919e+03  2.749e+03  -1.789 0.073695 .
## Lot.ConfigFR3    -3.087e+03  6.255e+03  -0.493 0.621734
## Lot.ConfigInside -1.291e+02  1.152e+03  -0.112 0.910754
## Land.SlopeMod     5.484e+03  2.594e+03   2.114 0.034629 *
## Land.SlopeSev    -2.499e+04  7.871e+03  -3.175 0.001516 **
## NeighborhoodBlueste  4.836e+03  9.289e+03   0.521 0.602678
## NeighborhoodBrDale  6.709e+03  7.492e+03   0.896 0.370583
## NeighborhoodBrkSide -5.597e+03  6.328e+03  -0.884 0.376533
## NeighborhoodClearCr -1.398e+04  6.736e+03  -2.076 0.037991 *
## NeighborhoodCollgCr -1.342e+04  5.647e+03  -2.377 0.017535 *
## NeighborhoodCrawfor  2.026e+03  6.242e+03   0.325 0.745470
## NeighborhoodEdwards -2.080e+04  5.933e+03  -3.506 0.000463 ***
## NeighborhoodGilbert -1.118e+04  5.200e+03  -2.149 0.031690 *
## NeighborhoodGreens  6.671e+03  9.662e+03   0.690 0.489963
## NeighborhoodGrnHill  1.030e+05  1.676e+04   6.148 9.01e-10 ***
## NeighborhoodIDOTRR -1.168e+04  6.968e+03  -1.676 0.093791 .
## NeighborhoodLandmrk -1.163e+04  2.303e+04  -0.505 0.613563
## NeighborhoodMeadowV -3.595e+03  7.768e+03  -0.463 0.643511
```

## NeighborhoodMitchel	-1.888e+04	6.217e+03	-3.037	0.002416	**
## NeighborhoodNames	-1.454e+04	5.348e+03	-2.718	0.006609	**
## NeighborhoodNoRidge	2.443e+04	5.762e+03	4.239	2.32e-05	***
## NeighborhoodNPkVill	1.375e+04	1.026e+04	1.340	0.180207	
## NeighborhoodNridgHt	1.498e+04	5.130e+03	2.920	0.003530	**
## NeighborhoodNWAmes	-1.625e+04	5.441e+03	-2.987	0.002847	**
## NeighborhoodOldTown	-1.578e+04	6.344e+03	-2.487	0.012927	*
## NeighborhoodSawyer	-1.152e+04	5.733e+03	-2.009	0.044616	*
## NeighborhoodSawyerW	-1.257e+04	5.364e+03	-2.343	0.019184	*
## NeighborhoodSomerst	9.345e+03	5.951e+03	1.570	0.116458	
## NeighborhoodStoneBr	3.510e+04	5.720e+03	6.135	9.78e-10	***
## NeighborhoodSWISU	-1.619e+04	6.892e+03	-2.349	0.018906	*
## NeighborhoodTimber	-1.294e+04	6.297e+03	-2.055	0.039948	*
## NeighborhoodVeenker	-1.099e+04	6.923e+03	-1.588	0.112438	
## Condition.1Feedr	4.457e+03	3.141e+03	1.419	0.155997	
## Condition.1Norm	1.286e+04	2.603e+03	4.939	8.35e-07	***
## Condition.1PosA	1.298e+04	5.973e+03	2.173	0.029855	*
## Condition.1PosN	1.800e+04	4.623e+03	3.894	0.000101	***
## Condition.1RR Ae	1.362e+03	5.358e+03	0.254	0.799333	
## Condition.1RR An	7.425e+03	4.362e+03	1.702	0.088858	.
## Condition.1RR Ne	4.262e+03	9.664e+03	0.441	0.659215	
## Condition.1RR Nn	-1.808e+02	8.023e+03	-0.023	0.982019	
## Condition.2Feedr	-7.740e+03	1.203e+04	-0.643	0.520122	
## Condition.2Norm	7.247e+02	1.043e+04	0.069	0.944636	
## Condition.2PosA	5.537e+04	1.589e+04	3.484	0.000503	***
## Condition.2PosN	-1.208e+05	1.575e+04	-7.669	2.41e-14	***
## Condition.2RR Ae	-3.881e+04	3.084e+04	-1.258	0.208447	
## Condition.2RR An	1.344e+03	2.437e+04	0.055	0.956015	
## Condition.2RR Nn	7.838e+03	1.887e+04	0.415	0.677959	
## Bldg.Type2fmCon	-2.918e+03	7.725e+03	-0.378	0.705650	
## Bldg.TypeDuplex	-1.317e+04	4.783e+03	-2.753	0.005951	**
## Bldg.TypeTwnhs	-2.100e+04	6.058e+03	-3.466	0.000536	***
## Bldg.TypeTwnhsE	-1.345e+04	5.402e+03	-2.489	0.012854	*
## House.Style1.5Unf	8.021e+03	5.650e+03	1.420	0.155816	
## House.Style1Story	5.836e+03	2.691e+03	2.169	0.030176	*
## House.Style2.5Fin	-1.640e+04	9.571e+03	-1.713	0.086830	.
## House.Style2.5Unf	-2.362e+03	5.410e+03	-0.437	0.662432	
## House.Style2Story	-1.814e+03	2.178e+03	-0.833	0.405042	
## House.StyleSFoyer	6.158e+03	3.887e+03	1.584	0.113235	
## House.StyleSLvl	4.571e+03	3.408e+03	1.341	0.179924	
## Overall.Qual	6.323e+03	6.409e+02	9.867	< 2e-16	***
## Overall.Cond	5.814e+03	5.514e+02	10.545	< 2e-16	***
## Year.Built	3.164e+02	4.949e+01	6.394	1.90e-10	***
## Year.Remod.Add	6.838e+01	3.527e+01	1.939	0.052623	.
## Roof.StyleGable	8.317e+03	1.010e+04	0.823	0.410417	
## Roof.StyleGambrel	7.427e+03	1.129e+04	0.658	0.510840	
## Roof.StyleHip	8.540e+03	1.018e+04	0.839	0.401779	
## Roof.StyleMansard	-2.356e+03	1.252e+04	-0.188	0.850738	
## Roof.StyleShed	2.805e+04	1.723e+04	1.628	0.103561	
## Roof.MatlCompShg	6.716e+05	3.220e+04	20.855	< 2e-16	***
## Roof.MatlMembran	7.318e+05	4.137e+04	17.690	< 2e-16	***
## Roof.MatlMetal	7.141e+05	4.124e+04	17.315	< 2e-16	***



## Roof.MatlRoll	6.706e+05	3.922e+04	17.096	< 2e-16	***
## Roof.MatlTar&Grv	6.710e+05	3.333e+04	20.131	< 2e-16	***
## Roof.MatlWdShake	6.707e+05	3.337e+04	20.098	< 2e-16	***
## Roof.MatlWdShngl	7.238e+05	3.330e+04	21.735	< 2e-16	***
## Exterior.1stAsphShn	-1.090e+04	2.381e+04	-0.458	0.647075	
## Exterior.1stBrkComm	6.493e+03	1.354e+04	0.480	0.631551	
## Exterior.1stBrkFace	1.720e+04	7.958e+03	2.161	0.030786	*
## Exterior.1stCBlock	7.862e+03	2.777e+04	0.283	0.777089	
## Exterior.1stCemntBd	-7.406e+03	1.265e+04	-0.585	0.558400	
## Exterior.1stHdBoard	-4.710e+03	7.779e+03	-0.606	0.544876	
## Exterior.1stImStucc	-2.058e+04	2.393e+04	-0.860	0.389704	
## Exterior.1stMetalSd	2.680e+03	8.739e+03	0.307	0.759087	
## Exterior.1stPlywood	-2.518e+03	7.636e+03	-0.330	0.741641	
## Exterior.1stPreCast	6.010e+04	2.333e+04	2.576	0.010034	*
## Exterior.1stStone	-1.443e+03	1.905e+04	-0.076	0.939620	
## Exterior.1stStucco	1.898e+03	8.624e+03	0.220	0.825866	
## Exterior.1stVinylSd	-8.576e+03	8.470e+03	-1.013	0.311363	
## Exterior.1stWd Sdng	-1.302e+03	7.508e+03	-0.173	0.862323	
## Exterior.1stWdShng	-3.765e+03	8.136e+03	-0.463	0.643556	
## Exterior.2ndAsphShn	1.487e+04	1.801e+04	0.825	0.409231	
## Exterior.2ndBrk Cmn	-4.801e+03	1.235e+04	-0.389	0.697424	
## Exterior.2ndBrkFace	-5.086e+03	8.756e+03	-0.581	0.561393	
## Exterior.2ndCBlock	9.937e+02	2.290e+04	0.043	0.965397	
## Exterior.2ndCmentBd	7.801e+03	1.286e+04	0.607	0.543993	
## Exterior.2ndHdBoard	2.884e+03	8.021e+03	0.360	0.719204	
## Exterior.2ndImStucc	6.101e+03	9.725e+03	0.627	0.530439	
## Exterior.2ndMetalSd	-2.666e+02	8.944e+03	-0.030	0.976227	
## Exterior.2ndOther	-1.317e+04	2.360e+04	-0.558	0.576914	
## Exterior.2ndPlywood	4.241e+02	7.728e+03	0.055	0.956236	
## Exterior.2ndPreCast	NA	NA	NA	NA	
## Exterior.2ndStone	-1.277e+04	1.318e+04	-0.969	0.332620	
## Exterior.2ndStucco	1.858e+03	8.818e+03	0.211	0.833121	
## Exterior.2ndVinylSd	1.011e+04	8.658e+03	1.168	0.242818	
## Exterior.2ndWd Sdng	1.528e+03	7.774e+03	0.197	0.844161	
## Exterior.2ndWd Shng	2.615e+03	8.146e+03	0.321	0.748239	
## Mas.Vnr.TypeBrkCmn	-8.166e+03	6.563e+03	-1.244	0.213526	
## Mas.Vnr.TypeBrkFace	-3.976e+03	4.839e+03	-0.822	0.411286	
## Mas.Vnr.TypeCBlock	-8.850e+04	2.720e+04	-3.253	0.001156	**
## Mas.Vnr.TypeNone	6.980e+02	4.717e+03	0.148	0.882383	
## Mas.Vnr.TypeStone	1.209e+03	4.921e+03	0.246	0.805892	
## Mas.Vnr.Area	2.428e+01	3.816e+00	6.363	2.32e-10	***
## Exter.QualFa	-1.813e+04	5.985e+03	-3.029	0.002473	**
## Exter.QualGd	-2.497e+04	3.103e+03	-8.046	1.28e-15	***
## Exter.QualTA	-2.592e+04	3.486e+03	-7.435	1.41e-13	***
## Exter.CondFa	6.646e+02	7.518e+03	0.088	0.929561	
## Exter.CondGd	4.671e+03	6.760e+03	0.691	0.489630	
## Exter.CondPo	-7.534e+03	1.685e+04	-0.447	0.654914	
## Exter.CondTA	5.905e+03	6.716e+03	0.879	0.379413	
## FoundationCBlock	-3.205e+02	1.975e+03	-0.162	0.871069	
## FoundationPConc	1.428e+03	2.166e+03	0.659	0.509876	
## FoundationSlab	-4.377e+03	6.011e+03	-0.728	0.466638	
## FoundationStone	1.145e+04	7.214e+03	1.587	0.112691	

## FoundationWood	-1.291e+04	1.028e+04	-1.255	0.209490
## Bsmt.Qual0	1.560e+04	3.275e+04	0.476	0.633914
## Bsmt.QualEx	-1.311e+04	4.190e+04	-0.313	0.754350
## Bsmt.QualFa	-2.628e+04	4.184e+04	-0.628	0.529909
## Bsmt.QualGd	-3.095e+04	4.182e+04	-0.740	0.459284
## Bsmt.QualPo	-1.970e+04	4.515e+04	-0.436	0.662584
## Bsmt.QualTA	-2.861e+04	4.181e+04	-0.684	0.493873
## Bsmt.Cond0	NA	NA	NA	NA
## Bsmt.CondEx	-7.299e+03	1.308e+04	-0.558	0.576909
## Bsmt.CondFa	1.249e+03	2.489e+03	0.502	0.615908
## Bsmt.CondGd	-1.802e+02	2.133e+03	-0.085	0.932660
## Bsmt.CondPo	1.034e+04	1.172e+04	0.882	0.377712
## Bsmt.CondTA	NA	NA	NA	NA
## Bsmt.Exposure0	NA	NA	NA	NA
## Bsmt.ExposureAv	1.119e+04	1.258e+04	0.890	0.373614
## Bsmt.ExposureGd	2.226e+04	1.268e+04	1.756	0.079213 .
## Bsmt.ExposureMn	4.488e+03	1.260e+04	0.356	0.721834
## Bsmt.ExposureNo	5.500e+03	1.254e+04	0.439	0.660932
## BsmtFin.Type.10	NA	NA	NA	NA
## BsmtFin.Type.1ALQ	-3.655e+03	1.872e+03	-1.952	0.051037 .
## BsmtFin.Type.1BLQ	-3.398e+03	2.001e+03	-1.698	0.089577 .
## BsmtFin.Type.1GLQ	-2.181e+02	1.771e+03	-0.123	0.902010
## BsmtFin.Type.1LwQ	-7.398e+03	2.326e+03	-3.181	0.001485 **
## BsmtFin.Type.1Rec	-5.917e+03	1.946e+03	-3.041	0.002379 **
## BsmtFin.Type.1Unf	NA	NA	NA	NA
## BsmtFin.SF.1	4.104e+01	3.070e+00	13.368	< 2e-16 ***
## BsmtFin.Type.20	NA	NA	NA	NA
## BsmtFin.Type.2ALQ	2.696e+04	2.226e+04	1.211	0.225867
## BsmtFin.Type.2BLQ	1.987e+04	2.220e+04	0.895	0.370793
## BsmtFin.Type.2GLQ	3.327e+04	2.253e+04	1.477	0.139865
## BsmtFin.Type.2LwQ	1.766e+04	2.220e+04	0.795	0.426419
## BsmtFin.Type.2Rec	1.943e+04	2.217e+04	0.877	0.380756
## BsmtFin.Type.2Unf	2.411e+04	2.214e+04	1.089	0.276272
## BsmtFin.SF.2	3.540e+01	5.324e+00	6.650	3.55e-11 ***
## Bsmt.Unf.SF	2.053e+01	2.797e+00	7.341	2.81e-13 ***
## Total.Bsmt.SF	NA	NA	NA	NA
## HeatingGasA	7.150e+03	2.267e+04	0.315	0.752435
## HeatingGasW	6.042e+03	2.314e+04	0.261	0.794051
## HeatingGrav	-5.938e+02	2.427e+04	-0.024	0.980487
## HeatingOthW	-2.146e+04	2.788e+04	-0.770	0.441457
## HeatingWall	2.038e+04	2.551e+04	0.799	0.424419
## Heating.QCFa	-3.524e+03	2.909e+03	-1.211	0.225834
## Heating.QCGd	-1.844e+03	1.327e+03	-1.390	0.164756
## Heating.QCPo	-1.810e+04	1.581e+04	-1.145	0.252429
## Heating.QCTA	-2.913e+03	1.304e+03	-2.234	0.025533 *
## Central.AirY	-3.405e+03	2.306e+03	-1.476	0.139972
## ElectricalFuseA	-9.556e+03	2.196e+04	-0.435	0.663406
## ElectricalFuseF	-9.853e+03	2.217e+04	-0.444	0.656725
## ElectricalFuseP	-1.108e+04	2.344e+04	-0.473	0.636389
## ElectricalMix	4.559e+03	3.626e+04	0.126	0.899964
## ElectricalSBkr	-1.016e+04	2.188e+04	-0.464	0.642475
## X1st.Flr.SF	4.859e+01	3.232e+00	15.033	< 2e-16 ***

## X2nd.Flr.SF	6.178e+01	3.524e+00	17.531	< 2e-16	***
## Low.Qual.Fin.SF	2.837e+01	1.069e+01	2.653	0.008019	**
## Gr.Liv.Area	NA	NA	NA	NA	
## Bsmt.Full.Bath	1.461e+03	1.231e+03	1.187	0.235245	
## Bsmt.Half.Bath	-1.440e+03	1.869e+03	-0.770	0.441131	
## Full.Bath	3.377e+03	1.375e+03	2.456	0.014114	*
## Half.Bath	1.940e+03	1.306e+03	1.486	0.137512	
## Bedroom.AbvGr	-3.916e+03	8.578e+02	-4.566	5.20e-06	***
## Kitchen.AbvGr	-1.218e+04	3.801e+03	-3.205	0.001366	**
## Kitchen.QualFa	-2.198e+04	3.965e+03	-5.543	3.26e-08	***
## Kitchen.QualGd	-2.095e+04	2.306e+03	-9.084	< 2e-16	***
## Kitchen.QualPo	1.324e+04	2.313e+04	0.573	0.567018	
## Kitchen.QualTA	-2.197e+04	2.574e+03	-8.536	< 2e-16	***
## TotRms.AbvGrd	1.000e+03	5.850e+02	1.710	0.087372	.
## FunctionalMaj2	8.741e+01	9.907e+03	0.009	0.992961	
## FunctionalMin1	1.202e+04	6.169e+03	1.949	0.051417	.
## FunctionalMin2	1.123e+04	6.221e+03	1.805	0.071135	.
## FunctionalMod	3.945e+03	6.854e+03	0.576	0.564923	
## FunctionalSal	-2.586e+03	2.201e+04	-0.117	0.906496	
## FunctionalSev	-1.875e+04	1.733e+04	-1.081	0.279583	
## FunctionalTyp	2.026e+04	5.557e+03	3.646	0.000272	***
## Fireplaces	7.609e+03	1.621e+03	4.693	2.82e-06	***
## Fireplace.QuEx	-2.916e+03	4.089e+03	-0.713	0.475818	
## Fireplace.QuFa	-9.363e+03	3.306e+03	-2.832	0.004663	**
## Fireplace.QuGd	-6.002e+03	2.187e+03	-2.745	0.006095	**
## Fireplace.QuPo	-4.284e+03	3.774e+03	-1.135	0.256451	
## Fireplace.QuTA	-6.887e+03	2.261e+03	-3.046	0.002340	**
## Garage.Type2Types	-2.294e+04	2.448e+04	-0.937	0.348885	
## Garage.TypeAttchd	-1.273e+04	2.405e+04	-0.529	0.596582	
## Garage.TypeBasment	-1.128e+04	2.421e+04	-0.466	0.641475	
## Garage.TypeBuiltIn	-1.262e+04	2.408e+04	-0.524	0.600373	
## Garage.TypeCarPort	-1.654e+04	2.469e+04	-0.670	0.503092	
## Garage.TypeDetchd	-1.213e+04	2.401e+04	-0.505	0.613586	
## Garage.Yr.Blt	3.398e+01	3.615e+01	0.940	0.347296	
## Garage.Finish0	NA	NA	NA	NA	
## Garage.FinishFin	-6.322e+04	7.406e+04	-0.854	0.393370	
## Garage.FinishRFn	-6.584e+04	7.402e+04	-0.889	0.373836	
## Garage.FinishUnf	-6.285e+04	7.401e+04	-0.849	0.395821	
## Garage.Cars	3.975e+03	1.461e+03	2.721	0.006556	**
## Garage.Area	1.584e+01	5.018e+00	3.157	0.001612	**
## Garage.Qual0	-5.829e+02	3.306e+04	-0.018	0.985936	
## Garage.QualEx	7.946e+04	1.883e+04	4.219	2.54e-05	***
## Garage.QualFa	-2.253e+02	2.577e+03	-0.087	0.930346	
## Garage.QualGd	1.179e+04	5.026e+03	2.346	0.019037	*
## Garage.QualPo	-1.154e+04	1.376e+04	-0.839	0.401426	
## Garage.QualTA	NA	NA	NA	NA	
## Garage.Cond0	NA	NA	NA	NA	
## Garage.CondEx	-6.025e+04	1.803e+04	-3.341	0.000846	***
## Garage.CondFa	-7.891e+02	3.229e+03	-0.244	0.806963	
## Garage.CondGd	-7.145e+03	6.215e+03	-1.150	0.250372	
## Garage.CondPo	3.523e+02	7.691e+03	0.046	0.963465	
## Garage.CondTA	NA	NA	NA	NA	

```

## Paved.DriveP      -1.563e+03  3.384e+03  -0.462  0.644131
## Paved.DriveY      2.089e+02  2.128e+03   0.098  0.921797
## Wood.Deck.SF      9.003e+00  3.765e+00   2.391  0.016868 *
## Open.Porch.SF    -2.925e+00  7.130e+00  -0.410  0.681726
## Enclosed.Porch    5.217e+00  7.519e+00   0.694  0.487831
## X3Ssn.Porch      -4.472e-01  1.685e+01  -0.027  0.978830
## Screen.Porch     4.136e+01  7.841e+00   5.275  1.44e-07 ***
## Pool.Area        1.171e+00  5.567e+01   0.021  0.983213
## Pool.QCEx        8.812e+04  2.278e+04   3.869  0.000112 ***
## Pool.QCFa        2.590e+04  4.232e+04   0.612  0.540648
## Pool.QCGd        3.043e+04  4.115e+04   0.739  0.459734
## Pool.QCTA        8.025e+03  2.864e+04   0.280  0.779336
## FenceGdPrv      -2.030e+03  2.237e+03  -0.907  0.364227
## FenceGdWo       1.884e+03  2.225e+03   0.847  0.397283
## FenceMnPrv       2.036e+03  1.414e+03   1.441  0.149844
## FenceMnWw       -1.888e+03  6.451e+03  -0.293  0.769827
## Misc.FeatureElev -5.336e+05  3.724e+04 -14.330 < 2e-16 ***
## Misc.FeatureGar2  2.432e+03  1.852e+04   0.131  0.895578
## Misc.FeatureOthr  2.070e+04  1.254e+04   1.651  0.098913 .
## Misc.FeatureShed  1.015e+03  2.769e+03   0.367  0.713938
## Misc.FeatureTenC -5.636e+04  3.250e+04  -1.734  0.082981 .
## Misc.Val         3.640e-01  1.683e+00   0.216  0.828733
## Mo.Sold          -1.650e+02  1.579e+02  -1.045  0.296042
## Yr.Sold          -2.345e+03  3.845e+03  -0.610  0.541962
## Sale.TypeCon      2.844e+04  1.033e+04   2.752  0.005960 **
## Sale.TypeConLD    7.296e+03  5.341e+03   1.366  0.172066
## Sale.TypeConLI   -1.489e+02  7.851e+03  -0.019  0.984872
## Sale.TypeConLw    6.562e+03  8.407e+03   0.781  0.435096
## Sale.TypeCWD      1.015e+04  6.902e+03   1.471  0.141510
## Sale.TypeNew      1.357e+04  9.866e+03   1.375  0.169168
## Sale.TypeOth      5.243e+03  8.682e+03   0.604  0.545988
## Sale.TypeVWD     -6.458e+03  2.232e+04  -0.289  0.772310
## Sale.TypeWD       2.339e+03  2.664e+03   0.878  0.379971
## Sale.ConditionAdjLand 1.639e+04  7.289e+03   2.249  0.024597 *
## Sale.ConditionAlloca 1.267e+04  5.549e+03   2.283  0.022497 *
## Sale.ConditionFamily 1.965e+03  3.726e+03   0.527  0.598090
## Sale.ConditionNormal 8.054e+03  1.899e+03   4.240  2.31e-05 ***
## Sale.ConditionPartial 6.101e+03  9.515e+03   0.641  0.521422
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 21370 on 2655 degrees of freedom
## Multiple R-squared:  0.9351, Adjusted R-squared:  0.9284
## F-statistic: 139.6 on 274 and 2655 DF, p-value: < 2.2e-16

```