In [246…
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt

data = pd.read_csv("train.csv")
data.head()
```

Out[246…

	Id	MSSubClass	MSZoning	LotFrontage	LotArea	Street	Alley	LotShape	LandContour	Utili
0	1	60	RL	65.0	8450	Pave	NaN	Reg	Lvl	All
1	2	20	RL	80.0	9600	Pave	NaN	Reg	Lvl	All
2	3	60	RL	68.0	11250	Pave	NaN	IR1	Lvl	All
3	4	70	RL	60.0	9550	Pave	NaN	IR1	Lvl	All
4	5	60	RL	84.0	14260	Pave	NaN	IR1	Lvl	All

5 rows × 81 columns

In [247…
```
data.shape #checks total row*column
```

Out[247… (1460, 81)

In [248…
```
data.info()    #non-null count, keep columns closer/equal to 1460
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1460 entries, 0 to 1459
Data columns (total 81 columns):
 #   Column          Non-Null Count  Dtype
---  ------          --------------  -----
 0   Id              1460 non-null   int64
 1   MSSubClass      1460 non-null   int64
 2   MSZoning        1460 non-null   object
 3   LotFrontage     1201 non-null   float64
 4   LotArea         1460 non-null   int64
 5   Street          1460 non-null   object
 6   Alley           91 non-null     object
 7   LotShape        1460 non-null   object
 8   LandContour     1460 non-null   object
 9   Utilities       1460 non-null   object
 10  LotConfig       1460 non-null   object
 11  LandSlope       1460 non-null   object
 12  Neighborhood    1460 non-null   object
 13  Condition1      1460 non-null   object
 14  Condition2      1460 non-null   object
 15  BldgType        1460 non-null   object
 16  HouseStyle      1460 non-null   object
 17  OverallQual     1460 non-null   int64
 18  OverallCond     1460 non-null   int64
 19  YearBuilt       1460 non-null   int64
 20  YearRemodAdd    1460 non-null   int64
 21  RoofStyle       1460 non-null   object
 22  RoofMatl        1460 non-null   object
 23  Exterior1st     1460 non-null   object
 24  Exterior2nd     1460 non-null   object
 25  MasVnrType      1452 non-null   object
 26  MasVnrArea      1452 non-null   float64
 27  ExterQual       1460 non-null   object
 28  ExterCond       1460 non-null   object
```

```
 29  Foundation     1460 non-null   object
 30  BsmtQual       1423 non-null   object
 31  BsmtCond       1423 non-null   object
 32  BsmtExposure   1422 non-null   object
 33  BsmtFinType1   1423 non-null   object
 34  BsmtFinSF1     1460 non-null   int64
 35  BsmtFinType2   1422 non-null   object
 36  BsmtFinSF2     1460 non-null   int64
 37  BsmtUnfSF      1460 non-null   int64
 38  TotalBsmtSF    1460 non-null   int64
 39  Heating        1460 non-null   object
 40  HeatingQC      1460 non-null   object
 41  CentralAir     1460 non-null   object
 42  Electrical     1459 non-null   object
 43  1stFlrSF       1460 non-null   int64
 44  2ndFlrSF       1460 non-null   int64
 45  LowQualFinSF   1460 non-null   int64
 46  GrLivArea      1460 non-null   int64
 47  BsmtFullBath   1460 non-null   int64
 48  BsmtHalfBath   1460 non-null   int64
 49  FullBath       1460 non-null   int64
 50  HalfBath       1460 non-null   int64
 51  BedroomAbvGr   1460 non-null   int64
 52  KitchenAbvGr   1460 non-null   int64
 53  KitchenQual    1460 non-null   object
 54  TotRmsAbvGrd   1460 non-null   int64
 55  Functional     1460 non-null   object
 56  Fireplaces     1460 non-null   int64
 57  FireplaceQu    770 non-null    object
 58  GarageType     1379 non-null   object
 59  GarageYrBlt    1379 non-null   float64
 60  GarageFinish   1379 non-null   object
 61  GarageCars     1460 non-null   int64
 62  GarageArea     1460 non-null   int64
 63  GarageQual     1379 non-null   object
 64  GarageCond     1379 non-null   object
 65  PavedDrive     1460 non-null   object
 66  WoodDeckSF     1460 non-null   int64
 67  OpenPorchSF    1460 non-null   int64
 68  EnclosedPorch  1460 non-null   int64
 69  3SsnPorch      1460 non-null   int64
 70  ScreenPorch    1460 non-null   int64
 71  PoolArea       1460 non-null   int64
 72  PoolQC         7 non-null      object
 73  Fence          281 non-null    object
 74  MiscFeature    54 non-null     object
 75  MiscVal        1460 non-null   int64
 76  MoSold         1460 non-null   int64
 77  YrSold         1460 non-null   int64
 78  SaleType       1460 non-null   object
 79  SaleCondition  1460 non-null   object
 80  SalePrice      1460 non-null   int64
dtypes: float64(3), int64(35), object(43)
memory usage: 924.0+ KB
```

In [249…

```
# Columns for which null values are greater than 80% are PoolQC, Fence, MiscFeat
```

In [250…

```
#create function for calculating missing values percentage > 30%

def missing_value_percentage(data):
    """ A function that returns the columns of the data file and their respectiv
    percent_missing = (data.isna().sum()/len(data.index))*100
    return percent_missing
```

```
df = missing_value_percentage(data)
print(df)
```

```
Id                0.000000
MSSubClass        0.000000
MSZoning          0.000000
LotFrontage      17.739726
LotArea           0.000000
                    ...
MoSold            0.000000
YrSold            0.000000
SaleType          0.000000
SaleCondition     0.000000
SalePrice         0.000000
Length: 81, dtype: float64
```

In [251…

```
import pandas as pd
data = pd.read_csv("train.csv")
df = missing_value_percentage(data)

def greaterThanToDict(n, data):
    """A function thats takes a number n, and creates a dictionary of all column
    that have a null percentage > n"""
    d = {}
    i = 0
    while i < len(data):
        if data[i] > n:
            d[data.index[i]] = data[i]
        i = i + 1

    return d

greaterThanToDict(30, df)
```

Out[251…

```
{'Alley': 93.76712328767123,
 'FireplaceQu': 47.26027397260274,
 'PoolQC': 99.52054794520548,
 'Fence': 80.75342465753424,
 'MiscFeature': 96.30136986301369}
```

In [252…

```
import pandas as pd
data = pd.read_csv("train.csv")
update_data = data.drop(["Alley", "PoolQC", "MiscFeature"], axis=1)

update_data['FireplaceQu'] = update_data['FireplaceQu'].fillna('NoFireplace')
update_data['Fence'] = update_data['Fence'].fillna('NoFence')

print(update_data.shape) #we can see that we dropped 3 columns
print(update_data)
#we have updated our data file to drop 3 columns which had an extremely high nul
#additionally, we updated null values to help create categorical response
```

```
(1460, 78)
        Id  MSSubClass MSZoning  LotFrontage  LotArea Street LotShape  \
0        1          60       RL         65.0     8450   Pave      Reg
1        2          20       RL         80.0     9600   Pave      Reg
2        3          60       RL         68.0    11250   Pave      IR1
3        4          70       RL         60.0     9550   Pave      IR1
4        5          60       RL         84.0    14260   Pave      IR1
...    ...         ...      ...          ...      ...    ...      ...
1455  1456          60       RL         62.0     7917   Pave      Reg
1456  1457          20       RL         85.0    13175   Pave      Reg
1457  1458          70       RL         66.0     9042   Pave      Reg
```

```
1458  1459          20       RL         68.0     9717   Pave      Reg
1459  1460          20       RL         75.0     9937   Pave      Reg

     LandContour Utilities LotConfig LandSlope Neighborhood Condition1  \
0            Lvl    AllPub    Inside       Gtl      CollgCr       Norm
1            Lvl    AllPub       FR2       Gtl      Veenker      Feedr
2            Lvl    AllPub    Inside       Gtl      CollgCr       Norm
3            Lvl    AllPub    Corner       Gtl      Crawfor       Norm
4            Lvl    AllPub       FR2       Gtl      NoRidge       Norm
...          ...       ...       ...       ...          ...        ...
1455         Lvl    AllPub    Inside       Gtl      Gilbert       Norm
1456         Lvl    AllPub    Inside       Gtl       NWAmes       Norm
1457         Lvl    AllPub    Inside       Gtl      Crawfor       Norm
1458         Lvl    AllPub    Inside       Gtl        NAmes       Norm
1459         Lvl    AllPub    Inside       Gtl      Edwards       Norm

     Condition2 BldgType HouseStyle  OverallQual  OverallCond  YearBuilt  \
0          Norm     1Fam     2Story            7            5       2003
1          Norm     1Fam     1Story            6            8       1976
2          Norm     1Fam     2Story            7            5       2001
3          Norm     1Fam     2Story            7            5       1915
4          Norm     1Fam     2Story            8            5       2000
...         ...      ...        ...          ...          ...        ...
1455       Norm     1Fam     2Story            6            5       1999
1456       Norm     1Fam     1Story            6            6       1978
1457       Norm     1Fam     2Story            7            9       1941
1458       Norm     1Fam     1Story            5            6       1950
1459       Norm     1Fam     1Story            5            6       1965

      YearRemodAdd RoofStyle RoofMatl Exterior1st Exterior2nd MasVnrType  \
0             2003     Gable  CompShg     VinylSd     VinylSd    BrkFace
1             1976     Gable  CompShg     MetalSd     MetalSd       None
2             2002     Gable  CompShg     VinylSd     VinylSd    BrkFace
3             1970     Gable  CompShg     Wd Sdng     Wd Shng       None
4             2000     Gable  CompShg     VinylSd     VinylSd    BrkFace
...            ...       ...      ...         ...         ...        ...
1455          2000     Gable  CompShg     VinylSd     VinylSd       None
1456          1988     Gable  CompShg     Plywood     Plywood      Stone
1457          2006     Gable  CompShg     CemntBd     CmentBd       None
1458          1996       Hip  CompShg     MetalSd     MetalSd       None
1459          1965     Gable  CompShg     HdBoard     HdBoard       None

      MasVnrArea ExterQual ExterCond Foundation BsmtQual BsmtCond  \
0          196.0        Gd        TA      PConc       Gd       TA
1            0.0        TA        TA     CBlock       Gd       TA
2          162.0        Gd        TA      PConc       Gd       TA
3            0.0        TA        TA     BrkTil       TA       Gd
4          350.0        Gd        TA      PConc       Gd       TA
...          ...       ...       ...        ...      ...      ...
1455         0.0        TA        TA      PConc       Gd       TA
1456       119.0        TA        TA     CBlock       Gd       TA
1457         0.0        Ex        Gd      Stone       TA       Gd
1458         0.0        TA        TA     CBlock       TA       TA
1459         0.0        Gd        TA     CBlock       TA       TA

     BsmtExposure BsmtFinType1  BsmtFinSF1 BsmtFinType2  BsmtFinSF2  ...  \
0              No          GLQ         706          Unf           0  ...
1              Gd          ALQ         978          Unf           0  ...
2              Mn          GLQ         486          Unf           0  ...
3              No          ALQ         216          Unf           0  ...
4              Av          GLQ         655          Unf           0  ...
...           ...          ...         ...          ...         ...  ...
1455           No          Unf           0          Unf           0  ...
1456           No          ALQ         790          Rec         163  ...
1457           No          GLQ         275          Unf           0  ...
```

```
1458           Mn          GLQ          49          Rec        1029  ...
1459           No          BLQ         830          LwQ         290  ...

      1stFlrSF  2ndFlrSF LowQualFinSF GrLivArea BsmtFullBath BsmtHalfBath  \
0          856       854            0      1710            1            0
1         1262         0            0      1262            0            1
2          920       866            0      1786            1            0
3          961       756            0      1717            1            0
4         1145      1053            0      2198            1            0
...        ...       ...          ...       ...          ...          ...
1455       953       694            0      1647            0            0
1456      2073         0            0      2073            1            0
1457      1188      1152            0      2340            0            0
1458      1078         0            0      1078            1            0
1459      1256         0            0      1256            1            0

      FullBath  HalfBath  BedroomAbvGr  KitchenAbvGr  KitchenQual  \
0            2         1             3             1           Gd
1            2         0             3             1           TA
2            2         1             3             1           Gd
3            1         0             3             1           Gd
4            2         1             4             1           Gd
...        ...       ...           ...           ...          ...
1455         2         1             3             1           TA
1456         2         0             3             1           TA
1457         2         0             4             1           Gd
1458         1         0             2             1           Gd
1459         1         1             3             1           TA

      TotRmsAbvGrd  Functional  Fireplaces  FireplaceQu  GarageType  \
0                8         Typ           0  NoFireplace      Attchd
1                6         Typ           1           TA      Attchd
2                6         Typ           1           TA      Attchd
3                7         Typ           1           Gd      Detchd
4                9         Typ           1           TA      Attchd
...            ...         ...         ...          ...         ...
1455             7         Typ           1           TA      Attchd
1456             7        Min1           2           TA      Attchd
1457             9         Typ           2           Gd      Attchd
1458             5         Typ           0  NoFireplace      Attchd
1459             6         Typ           0  NoFireplace      Attchd

     GarageYrBlt  GarageFinish GarageCars  GarageArea GarageQual GarageCond  \
0         2003.0           RFn          2         548         TA         TA
1         1976.0           RFn          2         460         TA         TA
2         2001.0           RFn          2         608         TA         TA
3         1998.0           Unf          3         642         TA         TA
4         2000.0           RFn          3         836         TA         TA
...          ...           ...        ...         ...        ...        ...
1455      1999.0           RFn          2         460         TA         TA
1456      1978.0           Unf          2         500         TA         TA
1457      1941.0           RFn          1         252         TA         TA
1458      1950.0           Unf          1         240         TA         TA
1459      1965.0           Fin          1         276         TA         TA

      PavedDrive WoodDeckSF  OpenPorchSF  EnclosedPorch 3SsnPorch ScreenPorch  \
0              Y          0           61              0         0           0
1              Y        298            0              0         0           0
2              Y          0           42              0         0           0
3              Y          0           35            272         0           0
4              Y        192           84              0         0           0
...          ...        ...          ...            ...       ...         ...
1455           Y          0           40              0         0           0
1456           Y        349            0              0         0           0
1457           Y          0           60              0         0           0
```

```
1458           Y        366            0            112         0           0
1459           Y        736           68              0         0           0

     PoolArea    Fence  MiscVal  MoSold  YrSold  SaleType  SaleCondition  \
0           0  NoFence        0       2    2008        WD         Normal
1           0  NoFence        0       5    2007        WD         Normal
2           0  NoFence        0       9    2008        WD         Normal
3           0  NoFence        0       2    2006        WD        Abnorml
4           0  NoFence        0      12    2008        WD         Normal
...       ...      ...      ...     ...     ...       ...            ...
1455        0  NoFence        0       8    2007        WD         Normal
1456        0    MnPrv        0       2    2010        WD         Normal
1457        0    GdPrv     2500       5    2010        WD         Normal
1458        0  NoFence        0       4    2010        WD         Normal
1459        0  NoFence        0       6    2008        WD         Normal

     SalePrice
0       208500
1       181500
2       223500
3       140000
4       250000
...        ...
1455    175000
1456    210000
1457    266500
1458    142125
1459    147500

[1460 rows x 78 columns]
```

In [253…

```
import pandas as pd
data = pd.read_csv("train.csv")
df = missing_value_percentage(data)

def greaterThanToDict(n, data):
    d = {}
    i = 0
    while i < len(data):
        if data[i] > n:
            d[data.index[i]] = data[i]
        i = i + 1

    return d

update_data = data.drop(["Alley", "PoolQC", "MiscFeature"], axis=1)

update_data['FireplaceQu'] = update_data['FireplaceQu'].fillna('NoFireplace')
update_data['Fence'] = update_data['Fence'].fillna('NoFence')


update_data =update_data.fillna(value='NONE')

lst = []
#loop through all the values of the GarageType column. Add the values to the lis
i = 0
while i < len(update_data):
    lst.append(update_data["GarageType"][i])
    i = i + 1

#print("NONE" in lst) #This double checks that our update_data =update_data.fill
#lst = ['Attchd', 'Attchd', 'Attchd' ...]
```

```
#These are the category columns that we can replace null values with "NONE"
noneCols = ['BsmtQual','BsmtCond' ,'BsmtExposure', 'BsmtFinType1','BsmtFinType2'

for i in noneCols:
    update_data[i] = update_data[i].fillna(value='NONE')


print(update_data)
```

```
        Id  MSSubClass MSZoning LotFrontage  LotArea Street LotShape  \
0        1          60       RL          65     8450   Pave      Reg
1        2          20       RL          80     9600   Pave      Reg
2        3          60       RL          68    11250   Pave      IR1
3        4          70       RL          60     9550   Pave      IR1
4        5          60       RL          84    14260   Pave      IR1
...    ...         ...      ...         ...      ...    ...      ...
1455  1456          60       RL          62     7917   Pave      Reg
1456  1457          20       RL          85    13175   Pave      Reg
1457  1458          70       RL          66     9042   Pave      Reg
1458  1459          20       RL          68     9717   Pave      Reg
1459  1460          20       RL          75     9937   Pave      Reg

     LandContour Utilities LotConfig LandSlope Neighborhood Condition1  \
0            Lvl    AllPub    Inside       Gtl      CollgCr       Norm
1            Lvl    AllPub       FR2       Gtl      Veenker      Feedr
2            Lvl    AllPub    Inside       Gtl      CollgCr       Norm
3            Lvl    AllPub    Corner       Gtl      Crawfor       Norm
4            Lvl    AllPub       FR2       Gtl      NoRidge       Norm
...          ...       ...       ...       ...          ...        ...
1455         Lvl    AllPub    Inside       Gtl      Gilbert       Norm
1456         Lvl    AllPub    Inside       Gtl       NWAmes       Norm
1457         Lvl    AllPub    Inside       Gtl      Crawfor       Norm
1458         Lvl    AllPub    Inside       Gtl        NAmes       Norm
1459         Lvl    AllPub    Inside       Gtl      Edwards       Norm

     Condition2 BldgType HouseStyle  OverallQual  OverallCond  YearBuilt  \
0          Norm     1Fam     2Story            7            5       2003
1          Norm     1Fam     1Story            6            8       1976
2          Norm     1Fam     2Story            7            5       2001
3          Norm     1Fam     2Story            7            5       1915
4          Norm     1Fam     2Story            8            5       2000
...         ...      ...        ...          ...          ...        ...
1455       Norm     1Fam     2Story            6            5       1999
1456       Norm     1Fam     1Story            6            6       1978
1457       Norm     1Fam     2Story            7            9       1941
1458       Norm     1Fam     1Story            5            6       1950
1459       Norm     1Fam     1Story            5            6       1965

      YearRemodAdd RoofStyle RoofMatl Exterior1st Exterior2nd MasVnrType  \
0             2003     Gable  CompShg     VinylSd     VinylSd    BrkFace
1             1976     Gable  CompShg     MetalSd     MetalSd       None
2             2002     Gable  CompShg     VinylSd     VinylSd    BrkFace
3             1970     Gable  CompShg     Wd Sdng     Wd Shng       None
4             2000     Gable  CompShg     VinylSd     VinylSd    BrkFace
...            ...       ...      ...         ...         ...        ...
1455          2000     Gable  CompShg     VinylSd     VinylSd       None
1456          1988     Gable  CompShg     Plywood     Plywood      Stone
1457          2006     Gable  CompShg     CemntBd     CmentBd       None
1458          1996       Hip  CompShg     MetalSd     MetalSd       None
1459          1965     Gable  CompShg     HdBoard     HdBoard       None

     MasVnrArea ExterQual ExterCond Foundation BsmtQual BsmtCond BsmtExposure  \
0           196        Gd        TA      PConc       Gd       TA           No
1             0        TA        TA     CBlock       Gd       TA           Gd
2           162        Gd        TA      PConc       Gd       TA           Mn
```

```
3            0        TA        TA     BrkTil       TA       Gd          No
4          350        Gd        TA      PConc       Gd       TA          Av
...        ...       ...       ...        ...      ...      ...         ...
1455         0        TA        TA      PConc       Gd       TA          No
1456       119        TA        TA     CBlock       Gd       TA          No
1457         0        Ex        Gd      Stone       TA       Gd          No
1458         0        TA        TA     CBlock       TA       TA          Mn
1459         0        Gd        TA     CBlock       TA       TA          No

     BsmtFinType1  BsmtFinSF1 BsmtFinType2  BsmtFinSF2  ...  1stFlrSF  \
0             GLQ         706          Unf           0  ...       856
1             ALQ         978          Unf           0  ...      1262
2             GLQ         486          Unf           0  ...       920
3             ALQ         216          Unf           0  ...       961
4             GLQ         655          Unf           0  ...      1145
...           ...         ...          ...         ...  ...       ...
1455          Unf           0          Unf           0  ...       953
1456          ALQ         790          Rec         163  ...      2073
1457          GLQ         275          Unf           0  ...      1188
1458          GLQ          49          Rec        1029  ...      1078
1459          BLQ         830          LwQ         290  ...      1256

      2ndFlrSF LowQualFinSF GrLivArea BsmtFullBath BsmtHalfBath  FullBath  \
0          854            0      1710            1            0         2
1            0            0      1262            0            1         2
2          866            0      1786            1            0         2
3          756            0      1717            1            0         1
4         1053            0      2198            1            0         2
...        ...          ...       ...          ...          ...       ...
1455       694            0      1647            0            0         2
1456         0            0      2073            1            0         2
1457      1152            0      2340            0            0         2
1458         0            0      1078            1            0         1
1459         0            0      1256            1            0         1

      HalfBath  BedroomAbvGr  KitchenAbvGr  KitchenQual  TotRmsAbvGrd  \
0            1             3             1           Gd             8
1            0             3             1           TA             6
2            1             3             1           Gd             6
3            0             3             1           Gd             7
4            1             4             1           Gd             9
...        ...           ...           ...          ...           ...
1455         1             3             1           TA             7
1456         0             3             1           TA             7
1457         0             4             1           Gd             9
1458         0             2             1           Gd             5
1459         1             3             1           TA             6

      Functional  Fireplaces  FireplaceQu  GarageType GarageYrBlt  \
0            Typ           0  NoFireplace      Attchd        2003
1            Typ           1           TA      Attchd        1976
2            Typ           1           TA      Attchd        2001
3            Typ           1           Gd      Detchd        1998
4            Typ           1           TA      Attchd        2000
...          ...         ...          ...         ...         ...
1455         Typ           1           TA      Attchd        1999
1456        Min1           2           TA      Attchd        1978
1457         Typ           2           Gd      Attchd        1941
1458         Typ           0  NoFireplace      Attchd        1950
1459         Typ           0  NoFireplace      Attchd        1965

      GarageFinish GarageCars  GarageArea GarageQual GarageCond PavedDrive  \
0              RFn          2         548         TA         TA          Y
1              RFn          2         460         TA         TA          Y
2              RFn          2         608         TA         TA          Y
```

```
3              Unf          3         642         TA         TA          Y
4              RFn          3         836         TA         TA          Y
...            ...        ...         ...        ...        ...        ...
1455           RFn          2         460         TA         TA          Y
1456           Unf          2         500         TA         TA          Y
1457           RFn          1         252         TA         TA          Y
1458           Unf          1         240         TA         TA          Y
1459           Fin          1         276         TA         TA          Y

      WoodDeckSF  OpenPorchSF  EnclosedPorch 3SsnPorch ScreenPorch PoolArea  \
0              0           61              0         0           0        0
1            298            0              0         0           0        0
2              0           42              0         0           0        0
3              0           35            272         0           0        0
4            192           84              0         0           0        0
...          ...          ...            ...       ...         ...      ...
1455           0           40              0         0           0        0
1456         349            0              0         0           0        0
1457           0           60              0         0           0        0
1458         366            0            112         0           0        0
1459         736           68              0         0           0        0

        Fence  MiscVal  MoSold  YrSold  SaleType  SaleCondition SalePrice
0     NoFence        0       2    2008        WD         Normal    208500
1     NoFence        0       5    2007        WD         Normal    181500
2     NoFence        0       9    2008        WD         Normal    223500
3     NoFence        0       2    2006        WD        Abnorml    140000
4     NoFence        0      12    2008        WD         Normal    250000
...       ...      ...     ...     ...       ...            ...       ...
1455  NoFence        0       8    2007        WD         Normal    175000
1456    MnPrv        0       2    2010        WD         Normal    210000
1457    GdPrv     2500       5    2010        WD         Normal    266500
1458  NoFence        0       4    2010        WD         Normal    142125
1459  NoFence        0       6    2008        WD         Normal    147500

[1460 rows x 78 columns]
```

In [254…
```
def calnullpercentage(df):
    print(df.isnull().sum()/len(df.index) *100)

calnullpercentage(update_data)
```

```
Id               0.0
MSSubClass       0.0
MSZoning         0.0
LotFrontage      0.0
LotArea          0.0
                ...
MoSold           0.0
YrSold           0.0
SaleType         0.0
SaleCondition    0.0
SalePrice        0.0
Length: 78, dtype: float64
```

In [255…
```
update_data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1460 entries, 0 to 1459
Data columns (total 78 columns):
 #   Column         Non-Null Count  Dtype
---  ------         --------------  -----
 0   Id             1460 non-null   int64
 1   MSSubClass     1460 non-null   int64
 2   MSZoning       1460 non-null   object
```

```
3   LotFrontage    1460 non-null   object
4   LotArea        1460 non-null   int64
5   Street         1460 non-null   object
6   LotShape       1460 non-null   object
7   LandContour    1460 non-null   object
8   Utilities      1460 non-null   object
9   LotConfig      1460 non-null   object
10  LandSlope      1460 non-null   object
11  Neighborhood   1460 non-null   object
12  Condition1     1460 non-null   object
13  Condition2     1460 non-null   object
14  BldgType       1460 non-null   object
15  HouseStyle     1460 non-null   object
16  OverallQual    1460 non-null   int64
17  OverallCond    1460 non-null   int64
18  YearBuilt      1460 non-null   int64
19  YearRemodAdd   1460 non-null   int64
20  RoofStyle      1460 non-null   object
21  RoofMatl       1460 non-null   object
22  Exterior1st    1460 non-null   object
23  Exterior2nd    1460 non-null   object
24  MasVnrType     1460 non-null   object
25  MasVnrArea     1460 non-null   object
26  ExterQual      1460 non-null   object
27  ExterCond      1460 non-null   object
28  Foundation     1460 non-null   object
29  BsmtQual       1460 non-null   object
30  BsmtCond       1460 non-null   object
31  BsmtExposure   1460 non-null   object
32  BsmtFinType1   1460 non-null   object
33  BsmtFinSF1     1460 non-null   int64
34  BsmtFinType2   1460 non-null   object
35  BsmtFinSF2     1460 non-null   int64
36  BsmtUnfSF      1460 non-null   int64
37  TotalBsmtSF    1460 non-null   int64
38  Heating        1460 non-null   object
39  HeatingQC      1460 non-null   object
40  CentralAir     1460 non-null   object
41  Electrical     1460 non-null   object
42  1stFlrSF       1460 non-null   int64
43  2ndFlrSF       1460 non-null   int64
44  LowQualFinSF   1460 non-null   int64
45  GrLivArea      1460 non-null   int64
46  BsmtFullBath   1460 non-null   int64
47  BsmtHalfBath   1460 non-null   int64
48  FullBath       1460 non-null   int64
49  HalfBath       1460 non-null   int64
50  BedroomAbvGr   1460 non-null   int64
51  KitchenAbvGr   1460 non-null   int64
52  KitchenQual    1460 non-null   object
53  TotRmsAbvGrd   1460 non-null   int64
54  Functional     1460 non-null   object
55  Fireplaces     1460 non-null   int64
56  FireplaceQu    1460 non-null   object
57  GarageType     1460 non-null   object
58  GarageYrBlt    1460 non-null   object
59  GarageFinish   1460 non-null   object
60  GarageCars     1460 non-null   int64
61  GarageArea     1460 non-null   int64
62  GarageQual     1460 non-null   object
63  GarageCond     1460 non-null   object
64  PavedDrive     1460 non-null   object
65  WoodDeckSF     1460 non-null   int64
66  OpenPorchSF    1460 non-null   int64
67  EnclosedPorch  1460 non-null   int64
```

```
 68  3SsnPorch      1460 non-null   int64
 69  ScreenPorch    1460 non-null   int64
 70  PoolArea       1460 non-null   int64
 71  Fence          1460 non-null   object
 72  MiscVal        1460 non-null   int64
 73  MoSold         1460 non-null   int64
 74  YrSold         1460 non-null   int64
 75  SaleType       1460 non-null   object
 76  SaleCondition  1460 non-null   object
 77  SalePrice      1460 non-null   int64
dtypes: int64(35), object(43)
memory usage: 889.8+ KB
```

In [256…
```
update_data.head(10)
```

Out[256…

	Id	MSSubClass	MSZoning	LotFrontage	LotArea	Street	LotShape	LandContour	Utilities	L
0	1	60	RL	65	8450	Pave	Reg	Lvl	AllPub	
1	2	20	RL	80	9600	Pave	Reg	Lvl	AllPub	
2	3	60	RL	68	11250	Pave	IR1	Lvl	AllPub	
3	4	70	RL	60	9550	Pave	IR1	Lvl	AllPub	
4	5	60	RL	84	14260	Pave	IR1	Lvl	AllPub	
5	6	50	RL	85	14115	Pave	IR1	Lvl	AllPub	
6	7	20	RL	75	10084	Pave	Reg	Lvl	AllPub	
7	8	60	RL	NONE	10382	Pave	IR1	Lvl	AllPub	
8	9	50	RM	51	6120	Pave	Reg	Lvl	AllPub	
9	10	190	RL	50	7420	Pave	Reg	Lvl	AllPub	

10 rows × 78 columns

In [257…
```
update_data['ScreenPorch'].value_counts()
#majority of data in ScreenPorch column is 0. Do not think there is enough data
```

Out[257…
```
0      1344
192       6
224       5
120       5
189       4
       ...
182       1
440       1
178       1
312       1
480       1
Name: ScreenPorch, Length: 76, dtype: int64
```

In [258…
```
update_data['3SsnPorch'].value_counts()
#majority of data in 3SsnPorch column is 0. Do not think there is enough data to
```

Out[258…
```
0      1436
168       3
216       2
144       2
180       2
245       1
```

```
238       1
290       1
196       1
182       1
407       1
304       1
162       1
153       1
320       1
140       1
130       1
96        1
23        1
508       1
Name: 3SsnPorch, dtype: int64
```

In [259…
```
update_data['PoolArea'].value_counts()
#majority of data in PoolArea column is 0. Do not think there is enough data to
```

Out[259…
```
0      1453
738       1
648       1
576       1
555       1
519       1
512       1
480       1
Name: PoolArea, dtype: int64
```

In [260…
```
update_data['MiscVal'].value_counts()
#majority of data in MiscVal column is 0. Do not think there is enough data to c
```

Out[260…
```
0        1408
400        11
500         8
700         5
450         4
2000        4
600         4
1200        2
480         2
1150        1
800         1
15500       1
620         1
3500        1
560         1
2500        1
1300        1
1400        1
350         1
8300        1
54          1
Name: MiscVal, dtype: int64
```

In [261…
```
#drop 4 columns which don't have enough meaningful data for analysis
data1 = update_data.drop(['3SsnPorch', 'ScreenPorch', 'PoolArea', 'MiscVal', "Id
```

In [262…
```
print(data1)
```

```
      MSSubClass MSZoning LotFrontage  LotArea Street LotShape LandContour  \
0             60       RL          65     8450   Pave      Reg         Lvl
1             20       RL          80     9600   Pave      Reg         Lvl
2             60       RL          68    11250   Pave      IR1         Lvl
```

```
3            70       RL          60     9550   Pave      IR1         Lvl
4            60       RL          84    14260   Pave      IR1         Lvl
...         ...      ...         ...      ...    ...      ...         ...
1455         60       RL          62     7917   Pave      Reg         Lvl
1456         20       RL          85    13175   Pave      Reg         Lvl
1457         70       RL          66     9042   Pave      Reg         Lvl
1458         20       RL          68     9717   Pave      Reg         Lvl
1459         20       RL          75     9937   Pave      Reg         Lvl

     Utilities LotConfig LandSlope Neighborhood Condition1 Condition2  \
0       AllPub    Inside       Gtl      CollgCr       Norm       Norm
1       AllPub       FR2       Gtl      Veenker      Feedr       Norm
2       AllPub    Inside       Gtl      CollgCr       Norm       Norm
3       AllPub    Corner       Gtl      Crawfor       Norm       Norm
4       AllPub       FR2       Gtl      NoRidge       Norm       Norm
...        ...       ...       ...          ...        ...        ...
1455    AllPub    Inside       Gtl      Gilbert       Norm       Norm
1456    AllPub    Inside       Gtl       NWAmes       Norm       Norm
1457    AllPub    Inside       Gtl      Crawfor       Norm       Norm
1458    AllPub    Inside       Gtl        NAmes       Norm       Norm
1459    AllPub    Inside       Gtl      Edwards       Norm       Norm

     BldgType HouseStyle  OverallQual  OverallCond  YearBuilt  YearRemodAdd  \
0        1Fam     2Story            7            5       2003          2003
1        1Fam     1Story            6            8       1976          1976
2        1Fam     2Story            7            5       2001          2002
3        1Fam     2Story            7            5       1915          1970
4        1Fam     2Story            8            5       2000          2000
...       ...        ...          ...          ...        ...           ...
1455     1Fam     2Story            6            5       1999          2000
1456     1Fam     1Story            6            6       1978          1988
1457     1Fam     2Story            7            9       1941          2006
1458     1Fam     1Story            5            6       1950          1996
1459     1Fam     1Story            5            6       1965          1965

     RoofStyle RoofMatl Exterior1st Exterior2nd MasVnrType MasVnrArea  \
0        Gable  CompShg     VinylSd     VinylSd    BrkFace        196
1        Gable  CompShg     MetalSd     MetalSd       None          0
2        Gable  CompShg     VinylSd     VinylSd    BrkFace        162
3        Gable  CompShg     Wd Sdng     Wd Shng       None          0
4        Gable  CompShg     VinylSd     VinylSd    BrkFace        350
...        ...      ...         ...         ...        ...        ...
1455     Gable  CompShg     VinylSd     VinylSd       None          0
1456     Gable  CompShg     Plywood     Plywood      Stone        119
1457     Gable  CompShg     CemntBd     CmentBd       None          0
1458       Hip  CompShg     MetalSd     MetalSd       None          0
1459     Gable  CompShg     HdBoard     HdBoard       None          0

     ExterQual ExterCond Foundation BsmtQual BsmtCond BsmtExposure  \
0           Gd        TA      PConc       Gd       TA           No
1           TA        TA     CBlock       Gd       TA           Gd
2           Gd        TA      PConc       Gd       TA           Mn
3           TA        TA     BrkTil       TA       Gd           No
4           Gd        TA      PConc       Gd       TA           Av
...        ...       ...        ...      ...      ...          ...
1455        TA        TA      PConc       Gd       TA           No
1456        TA        TA     CBlock       Gd       TA           No
1457        Ex        Gd      Stone       TA       Gd           No
1458        TA        TA     CBlock       TA       TA           Mn
1459        Gd        TA     CBlock       TA       TA           No

     BsmtFinType1  BsmtFinSF1 BsmtFinType2  BsmtFinSF2  BsmtUnfSF  \
0             GLQ         706          Unf           0        150
1             ALQ         978          Unf           0        284
2             GLQ         486          Unf           0        434
```

```
3             ALQ         216          Unf           0        540
4             GLQ         655          Unf           0        490
...           ...         ...          ...         ...        ...
1455          Unf           0          Unf           0        953
1456          ALQ         790          Rec         163        589
1457          GLQ         275          Unf           0        877
1458          GLQ          49          Rec        1029          0
1459          BLQ         830          LwQ         290        136

      TotalBsmtSF Heating HeatingQC CentralAir Electrical  1stFlrSF  2ndFlrSF  \
0             856    GasA        Ex          Y      SBrkr       856       854
1            1262    GasA        Ex          Y      SBrkr      1262         0
2             920    GasA        Ex          Y      SBrkr       920       866
3             756    GasA        Gd          Y      SBrkr       961       756
4            1145    GasA        Ex          Y      SBrkr      1145      1053
...           ...     ...       ...        ...        ...       ...       ...
1455          953    GasA        Ex          Y      SBrkr       953       694
1456         1542    GasA        TA          Y      SBrkr      2073         0
1457         1152    GasA        Ex          Y      SBrkr      1188      1152
1458         1078    GasA        Gd          Y      FuseA      1078         0
1459         1256    GasA        Gd          Y      SBrkr      1256         0

      LowQualFinSF  GrLivArea  BsmtFullBath  BsmtHalfBath  FullBath  HalfBath  \
0                0       1710             1             0         2         1
1                0       1262             0             1         2         0
2                0       1786             1             0         2         1
3                0       1717             1             0         1         0
4                0       2198             1             0         2         1
...            ...        ...           ...           ...       ...       ...
1455             0       1647             0             0         2         1
1456             0       2073             1             0         2         0
1457             0       2340             0             0         2         0
1458             0       1078             1             0         1         0
1459             0       1256             1             0         1         1

      BedroomAbvGr  KitchenAbvGr KitchenQual  TotRmsAbvGrd Functional  \
0                3             1          Gd             8        Typ
1                3             1          TA             6        Typ
2                3             1          Gd             6        Typ
3                3             1          Gd             7        Typ
4                4             1          Gd             9        Typ
...            ...           ...         ...           ...       ...
1455             3             1          TA             7        Typ
1456             3             1          TA             7       Min1
1457             4             1          Gd             9        Typ
1458             2             1          Gd             5        Typ
1459             3             1          TA             6        Typ

      Fireplaces  FireplaceQu GarageType GarageYrBlt GarageFinish  GarageCars  \
0              0  NoFireplace     Attchd        2003          RFn           2
1              1           TA     Attchd        1976          RFn           2
2              1           TA     Attchd        2001          RFn           2
3              1           Gd     Detchd        1998          Unf           3
4              1           TA     Attchd        2000          RFn           3
...          ...          ...        ...         ...          ...         ...
1455           1           TA     Attchd        1999          RFn           2
1456           2           TA     Attchd        1978          Unf           2
1457           2           Gd     Attchd        1941          RFn           1
1458           0  NoFireplace     Attchd        1950          Unf           1
1459           0  NoFireplace     Attchd        1965          Fin           1

      GarageArea GarageQual GarageCond PavedDrive  WoodDeckSF  OpenPorchSF  \
0            548         TA         TA          Y           0           61
1            460         TA         TA          Y         298            0
2            608         TA         TA          Y           0           42
```

```
3            642         TA         TA          Y           0          35
4            836         TA         TA          Y         192          84
...          ...        ...        ...        ...         ...         ...
1455         460         TA         TA          Y           0          40
1456         500         TA         TA          Y         349           0
1457         252         TA         TA          Y           0          60
1458         240         TA         TA          Y         366           0
1459         276         TA         TA          Y         736          68

      EnclosedPorch    Fence  MoSold  YrSold SaleType SaleCondition  SalePrice
0                 0  NoFence       2    2008       WD        Normal     208500
1                 0  NoFence       5    2007       WD        Normal     181500
2                 0  NoFence       9    2008       WD        Normal     223500
3               272  NoFence       2    2006       WD       Abnorml     140000
4                 0  NoFence      12    2008       WD        Normal     250000
...             ...      ...     ...     ...      ...           ...        ...
1455              0  NoFence       8    2007       WD        Normal     175000
1456              0    MnPrv       2    2010       WD        Normal     210000
1457              0    GdPrv       5    2010       WD        Normal     266500
1458            112  NoFence       4    2010       WD        Normal     142125
1459              0  NoFence       6    2008       WD        Normal     147500

[1460 rows x 73 columns]
```

In [263…

```
#create copy of data1

data2 = data1.copy()
data2.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1460 entries, 0 to 1459
Data columns (total 73 columns):
 #   Column          Non-Null Count  Dtype 
---  ------          --------------  ----- 
 0   MSSubClass      1460 non-null   int64 
 1   MSZoning        1460 non-null   object
 2   LotFrontage     1460 non-null   object
 3   LotArea         1460 non-null   int64 
 4   Street          1460 non-null   object
 5   LotShape        1460 non-null   object
 6   LandContour     1460 non-null   object
 7   Utilities       1460 non-null   object
 8   LotConfig       1460 non-null   object
 9   LandSlope       1460 non-null   object
 10  Neighborhood    1460 non-null   object
 11  Condition1      1460 non-null   object
 12  Condition2      1460 non-null   object
 13  BldgType        1460 non-null   object
 14  HouseStyle      1460 non-null   object
 15  OverallQual     1460 non-null   int64 
 16  OverallCond     1460 non-null   int64 
 17  YearBuilt       1460 non-null   int64 
 18  YearRemodAdd    1460 non-null   int64 
 19  RoofStyle       1460 non-null   object
 20  RoofMatl        1460 non-null   object
 21  Exterior1st     1460 non-null   object
 22  Exterior2nd     1460 non-null   object
 23  MasVnrType      1460 non-null   object
 24  MasVnrArea      1460 non-null   object
 25  ExterQual       1460 non-null   object
 26  ExterCond       1460 non-null   object
 27  Foundation      1460 non-null   object
 28  BsmtQual        1460 non-null   object
 29  BsmtCond        1460 non-null   object
 30  BsmtExposure    1460 non-null   object
```

```
 31  BsmtFinType1   1460 non-null   object
 32  BsmtFinSF1     1460 non-null   int64
 33  BsmtFinType2   1460 non-null   object
 34  BsmtFinSF2     1460 non-null   int64
 35  BsmtUnfSF      1460 non-null   int64
 36  TotalBsmtSF    1460 non-null   int64
 37  Heating        1460 non-null   object
 38  HeatingQC      1460 non-null   object
 39  CentralAir     1460 non-null   object
 40  Electrical     1460 non-null   object
 41  1stFlrSF       1460 non-null   int64
 42  2ndFlrSF       1460 non-null   int64
 43  LowQualFinSF   1460 non-null   int64
 44  GrLivArea      1460 non-null   int64
 45  BsmtFullBath   1460 non-null   int64
 46  BsmtHalfBath   1460 non-null   int64
 47  FullBath       1460 non-null   int64
 48  HalfBath       1460 non-null   int64
 49  BedroomAbvGr   1460 non-null   int64
 50  KitchenAbvGr   1460 non-null   int64
 51  KitchenQual    1460 non-null   object
 52  TotRmsAbvGrd   1460 non-null   int64
 53  Functional     1460 non-null   object
 54  Fireplaces     1460 non-null   int64
 55  FireplaceQu    1460 non-null   object
 56  GarageType     1460 non-null   object
 57  GarageYrBlt    1460 non-null   object
 58  GarageFinish   1460 non-null   object
 59  GarageCars     1460 non-null   int64
 60  GarageArea     1460 non-null   int64
 61  GarageQual     1460 non-null   object
 62  GarageCond     1460 non-null   object
 63  PavedDrive     1460 non-null   object
 64  WoodDeckSF     1460 non-null   int64
 65  OpenPorchSF    1460 non-null   int64
 66  EnclosedPorch  1460 non-null   int64
 67  Fence          1460 non-null   object
 68  MoSold         1460 non-null   int64
 69  YrSold         1460 non-null   int64
 70  SaleType       1460 non-null   object
 71  SaleCondition  1460 non-null   object
 72  SalePrice      1460 non-null   int64
dtypes: int64(30), object(43)
memory usage: 832.8+ KB
```

In [264…

```
#numeric columns
display(data2.select_dtypes("int64"))
pd.options.display.max_columns = 73
```

	MSSubClass	LotArea	OverallQual	OverallCond	YearBuilt	YearRemodAdd	BsmtFinSF1	Bs
0	60	8450	7	5	2003	2003	706	
1	20	9600	6	8	1976	1976	978	
2	60	11250	7	5	2001	2002	486	
3	70	9550	7	5	1915	1970	216	
4	60	14260	8	5	2000	2000	655	
...	...	...	...	...	...	...	...	
1455	60	7917	6	5	1999	2000	0	
1456	20	13175	6	6	1978	1988	790	

	MSSubClass	LotArea	OverallQual	OverallCond	YearBuilt	YearRemodAdd	BsmtFinSF1	Bs
1457	70	9042	7	9	1941	2006	275	
1458	20	9717	5	6	1950	1996	49	
1459	20	9937	5	6	1965	1965	830	

1460 rows × 30 columns

In [265…
```
convert_to_categ = ['MSSubClass','OverallQual', 'OverallCond', 'BsmtFullBath', '

data2[convert_to_categ] = data2[convert_to_categ].astype('object')
```

In [266…
```
data2.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1460 entries, 0 to 1459
Data columns (total 73 columns):
 #   Column          Non-Null Count  Dtype
---  ------          --------------  -----
 0   MSSubClass      1460 non-null   object
 1   MSZoning        1460 non-null   object
 2   LotFrontage     1460 non-null   object
 3   LotArea         1460 non-null   int64
 4   Street          1460 non-null   object
 5   LotShape        1460 non-null   object
 6   LandContour     1460 non-null   object
 7   Utilities       1460 non-null   object
 8   LotConfig       1460 non-null   object
 9   LandSlope       1460 non-null   object
 10  Neighborhood    1460 non-null   object
 11  Condition1      1460 non-null   object
 12  Condition2      1460 non-null   object
 13  BldgType        1460 non-null   object
 14  HouseStyle      1460 non-null   object
 15  OverallQual     1460 non-null   object
 16  OverallCond     1460 non-null   object
 17  YearBuilt       1460 non-null   int64
 18  YearRemodAdd    1460 non-null   int64
 19  RoofStyle       1460 non-null   object
 20  RoofMatl        1460 non-null   object
 21  Exterior1st     1460 non-null   object
 22  Exterior2nd     1460 non-null   object
 23  MasVnrType      1460 non-null   object
 24  MasVnrArea      1460 non-null   object
 25  ExterQual       1460 non-null   object
 26  ExterCond       1460 non-null   object
 27  Foundation      1460 non-null   object
 28  BsmtQual        1460 non-null   object
 29  BsmtCond        1460 non-null   object
 30  BsmtExposure    1460 non-null   object
 31  BsmtFinType1    1460 non-null   object
 32  BsmtFinSF1      1460 non-null   int64
 33  BsmtFinType2    1460 non-null   object
 34  BsmtFinSF2      1460 non-null   int64
 35  BsmtUnfSF       1460 non-null   int64
 36  TotalBsmtSF     1460 non-null   int64
 37  Heating         1460 non-null   object
 38  HeatingQC       1460 non-null   object
 39  CentralAir      1460 non-null   object
 40  Electrical      1460 non-null   object
 41  1stFlrSF        1460 non-null   int64
```

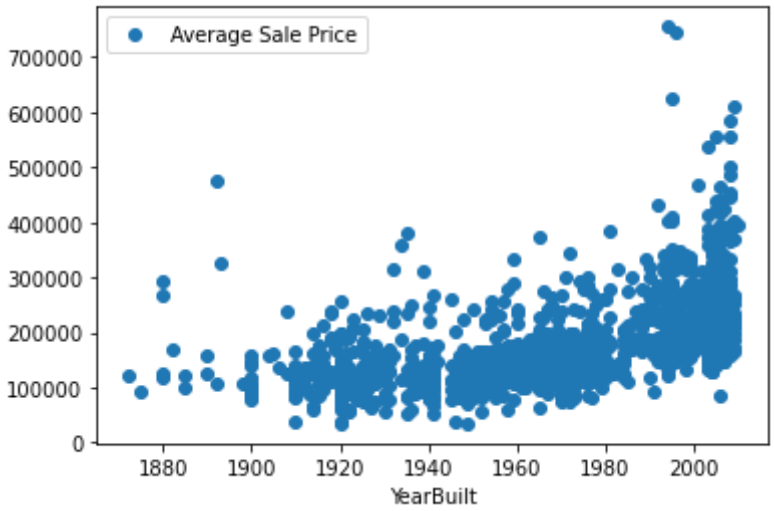
```
 42  2ndFlrSF        1460 non-null   int64
 43  LowQualFinSF    1460 non-null   int64
 44  GrLivArea       1460 non-null   int64
 45  BsmtFullBath    1460 non-null   object
 46  BsmtHalfBath    1460 non-null   object
 47  FullBath        1460 non-null   object
 48  HalfBath        1460 non-null   object
 49  BedroomAbvGr    1460 non-null   object
 50  KitchenAbvGr    1460 non-null   object
 51  KitchenQual     1460 non-null   object
 52  TotRmsAbvGrd    1460 non-null   object
 53  Functional      1460 non-null   object
 54  Fireplaces      1460 non-null   object
 55  FireplaceQu     1460 non-null   object
 56  GarageType      1460 non-null   object
 57  GarageYrBlt     1460 non-null   object
 58  GarageFinish    1460 non-null   object
 59  GarageCars      1460 non-null   object
 60  GarageArea      1460 non-null   int64
 61  GarageQual      1460 non-null   object
 62  GarageCond      1460 non-null   object
 63  PavedDrive      1460 non-null   object
 64  WoodDeckSF      1460 non-null   int64
 65  OpenPorchSF     1460 non-null   int64
 66  EnclosedPorch   1460 non-null   int64
 67  Fence           1460 non-null   object
 68  MoSold          1460 non-null   int64
 69  YrSold          1460 non-null   int64
 70  SaleType        1460 non-null   object
 71  SaleCondition   1460 non-null   object
 72  SalePrice       1460 non-null   int64
dtypes: int64(18), object(55)
memory usage: 832.8+ KB
```

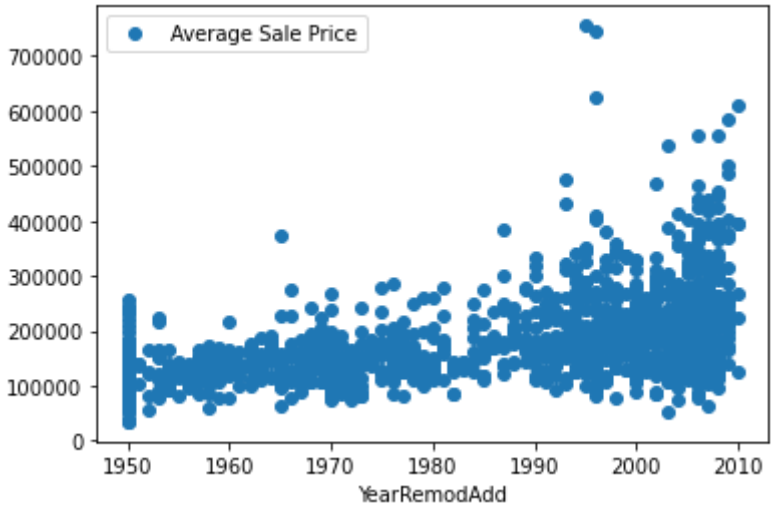
In [ ]:

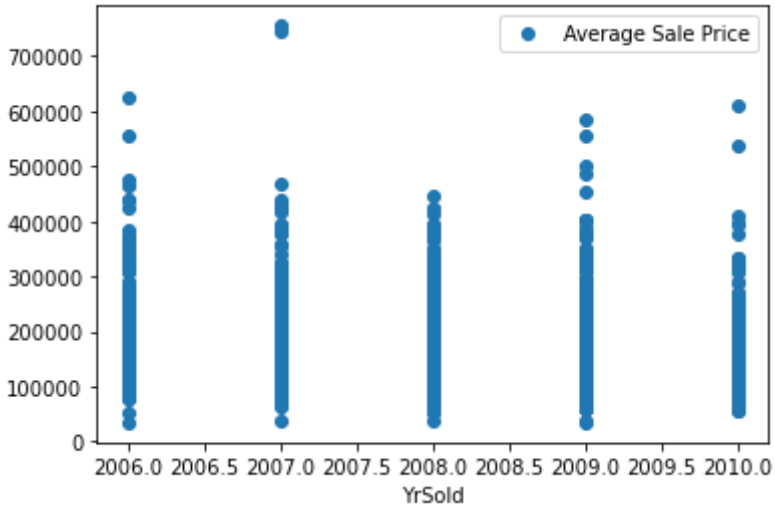
In [274…

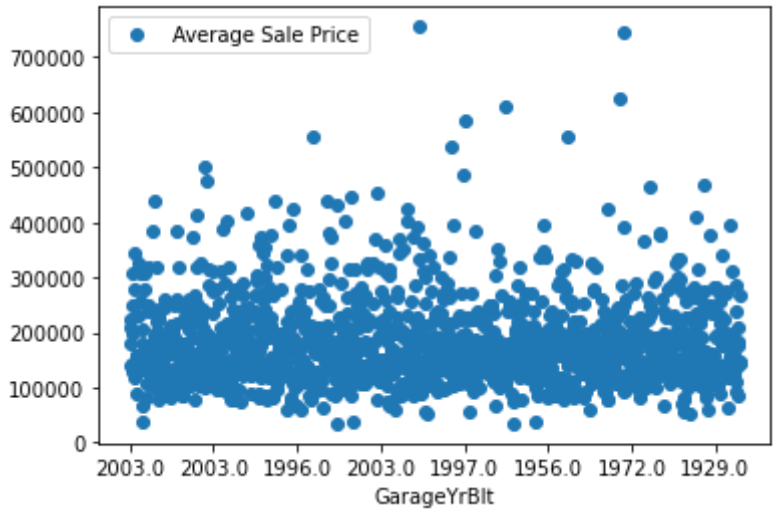
```
#Year Features

col = ['YearBuilt','YearRemodAdd','YrSold','GarageYrBlt']
i = 1
for col_name in col:
    d = {col_name : data2[col_name], 'Average Sale Price': data2['SalePrice']}
    df = pd.DataFrame(d)
    df.plot(col_name ,y=['Average Sale Price'], style = 'o')
    #y = data2['SalePrice']
    #data2[x, y].plot( x = 'col_name', y = 'Average Sale Price')
    #df.plot(x= x_data, y='Average Sale Price', style='o')
    i += 1
    plt.show
```


Average Sale Price
700000
600000
500000
400000
300000
200000
100000
0
1880
1900
1920
1940
1960
1980
2000
YearBuilt


Average Sale Price
700000
600000
500000
400000
300000
200000
100000
0
1950
1960
1970
1980
1990
2000
2010
YearRemodAdd


Average Sale Price
700000
600000
500000
400000
300000
200000
100000
0
2006.0
2006.5
2007.0
2007.5
2008.0
2008.5
2009.0
2009.5
2010.0
YrSold


Average Sale Price
700000
600000
500000
400000
300000
200000
100000
0
2003.0 2003.0 1996.0 2003.0 1997.0 1956.0 1972.0 1929.0
GarageYrBlt

In [ ]:

In [ ]: