After modifying train Data in part 1 Here we will do further steps like getting dummies, minimizing number of columns, train test split

```
from google.colab import drive
drive.mount('/content/drive')
```

```
     Mounted at /content/drive
```

```
import pandas as pd
```

```
import numpy as np
import seaborn as sns
import matplotlib.pyplot as plt

%matplotlib inline
sns.set(rc = {'figure.figsize':[10, 10]}, font_scale = 1.2)
```

```
# pics = /content/drive/MyDrive/House price prediction/Final Project house prediction/House prediction pics
df = pd.read_csv("/content/drive/MyDrive/House price prediction/Final Project house prediction/final_mod_house_price_with mi
df.head()
```

	Unnamed: 0	dwelling_involved_type	general_zoning_classification	Total_area	type_of_road	property_general_shape
0	0	60.0	RL	8450.0	Pave	Reg
1	1	20.0	RL	9600.0	Pave	Reg
2	2	60.0	RL	11250.0	Pave	IR1
3	3	70.0	RL	9550.0	Pave	IR1
4	4	60.0	RL	14260.0	Pave	IR1

5 rows × 76 columns

```
df.drop(['Unnamed: 0'],axis = 1, inplace = True)
```

```
pd.set_option('display.max_columns', 200)
df.head()
```

	dwelling_involved_type	general_zoning_classification	Total_area	type_of_road	property_general_shape	property_F
0	60.0	RL	8450.0	Pave	Reg	
1	20.0	RL	9600.0	Pave	Reg	
2	60.0	RL	11250.0	Pave	IR1	
3	70.0	RL	9550.0	Pave	IR1	
4	60.0	RL	14260.0	Pave	IR1	

I was thinking do we really need areas, height of each part Like Lots, finished and unfinished parts of house?

Maybe it's very important thing but not for now we will try copying them and drop them off from our data frame and we will rely on one column **for now** .... finished percentage of house

Like If I was a customer What may get my interest is Like how much really I could pay if the house was unfinished or when

And Finished, unfinished percentages will may answer my question

Initial thoughts

About those columns

- LotArea
- MasVnrArea
- BsmtFinType2

- BsmtFinSF2
- 1stFlrSF
- 2ndFlrSF
- LowQualFinSF
- GrLivArea
- GarageArea WoodDeckSF
- OpenPorchSF EnclosedPorch
    - If Garage area, wood deck SF = 0 There's not any Garage nor wood deck , else there's a garage and then we would check if existance of them would raise our house sale price
    - And same for number of floors like there's 2 floors and a basement or 1 floor with or w/o a basement. And same for pool
    - And we can split our Areas depending on mean like above mean or under mean and mention the mean of total area
    - After checking sample submission we can tell we need only 2 columns as an output Id, Saleprice
        - In other meanings we only need to predict Sale price

Another look

We really need to see each aspect visually of our data

- LotArea
- Mszoning And so on..

Let's translate them in arabic maybe it'll be easier to us

- What we got from pinterest and google in general?
    - Porsch المنطقة اللى ادام الباب (مدخل المنزل)

```
## Let's make a copy
```

```
df_n = df.copy()

df_n.columns
```

```
Index(['dwelling_involved_type', 'general_zoning_classification', 'Total_area',
       'type_of_road', 'property_general_shape', 'property_Flatness',
       'utilities_types', 'LotConfig', 'LandSlope', 'Neighborhood',
       'dwelling_type', 'HouseStyle', 'OverallQual', 'OverallCond',
       'RoofStyle', 'roof_material', 'exterior_covering_1',
       'exterior_covering_2', 'masonry_veneer_type', 'MasVnrArea', 'ExterQual',
       'ExterCond', 'Foundation', 'BsmtQual', 'BsmtCond', 'BsmtExposure',
       'BsmtFinType1', 'BsmtFinType2', 'BsmtFinSF2', 'TotalBsmtSF', 'Heating',
       'HeatingQC', 'CentralAir', 'electrical_system', '1stFlrSF', '2ndFlrSF',
       'LowQualFinSF', 'GrLivArea', 'BsmtFullBath', 'BsmtHalfBath', 'FullBath',
       'HalfBath', 'BedroomAbvGr', 'KitchenAbvGr', 'KitchenQual',
       'total_rooms_above_grade', 'Functional', 'Fireplaces', 'GarageType',
       'GarageYrBlt', 'interior_finish_garage', 'garage_car_capacity',
       'GarageArea', 'GarageQual', 'GarageCond', 'PavedDrive', 'WoodDeckSF',
       'OpenPorchSF', 'EnclosedPorch', 'three_season_porch_area',
       'ScreenPorch', 'PoolArea', 'other_features_values', 'MoSold', 'YrSold',
       'SaleType', 'SaleCondition', 'SalePrice', 'year_diff', 'Is_diff',
       'finish_percentage_of_Bsmt', 'Unfinished_percentage_of_Bsmt',
       'LotFrontage', 'Condition_all', 'Bsmt Exposure'],
      dtype='object')
```

```
df_n['PoolArea'].isnull().values.any()
```

```
False
```

```
df_n['2ndFlrSF'].isnull().values.any()
```

```
False
```

```
df_n['Pool_exist'] = df_n['PoolArea'].apply(lambda x: 0 if x == 0 else 1) # if there's a pool or not
df_n['2ndFlr_exist'] = df_n['2ndFlrSF'].apply(lambda x: 0 if x == 0 else 1) ## If it's 2 floor or only 1
```

```
# Lot Area is total size of property We can divide it by quartiles and make a new column to mention is it in first_quartile
quartiles = df_n['Total_area'].quantile([.25, .5, .75]).tolist()
```

```
quartiles
```

```
[7500.0, 9268.0, 11191.5]
```

```
df_n['Total_area'].dtypes
```

```
dtype('float64')
```

We are trying to convert numerical variables into categorical variables and then we convert them to get dummies

```
df_n["quantile ranges"] = pd.qcut(df_n["Total_area"], q=[0, 0.4, 0.8, 1],
                         labels=["lowest", "middle", "top"])
df_n.head()
```

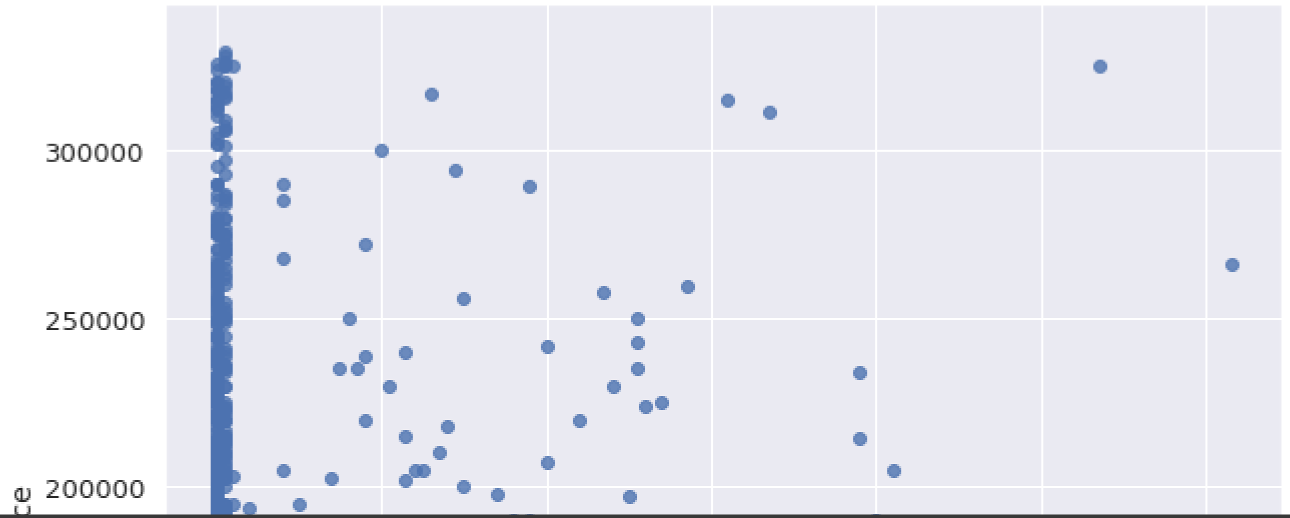
	dwelling_involved_type	general_zoning_classification	Total_area	type_of_road	property_general_shape	property_F
0	60.0	RL	8450.0	Pave	Reg	
1	20.0	RL	9600.0	Pave	Reg	
2	60.0	RL	11250.0	Pave	IR1	
3	70.0	RL	9550.0	Pave	IR1	
4	60.0	RL	14260.0	Pave	IR1	

```
df_n.rename(columns = {'quantile ranges':"quantile_ranges_of_areas"}, inplace = True)
df_n
```

	dwelling_involved_type	general_zoning_classification	Total_area	type_of_road	property_general_shape	propert
0	60.0	RL	8450.0	Pave	Reg	
1	20.0	RL	9600.0	Pave	Reg	
2	60.0	RL	11250.0	Pave	IR1	
3	70.0	RL	9550.0	Pave	IR1	
4	60.0	RL	14260.0	Pave	IR1	
...	...	...	...	...	...	
1097	60.0	RL	10186.0	Pave	IR1	
1098	20.0	RL	9986.0	Pave	Reg	
1099	20.0	RL	6600.0	Pave	Reg	

```
sns.regplot(x="year_diff", y="SalePrice", data=df_n)
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7fe088942bd0>
```



That's normal when year difference is large There's a drop in a price

But from the plot we can see there's also outliers Like there's more than 100 year difference and still sold with high prices

```
    # Unfinished_percentage_of_Bsmt
df_n["quantile_ranges_of_basement_finished_areas"] = pd.qcut(df_n["finish_percentage_of_Bsmt"], q=[0, 0.4, 0.8, 1],
                         labels=["Hadn't_started", "nearly 50% finished", "mostly finished"])
df_n.head()
```

	dwelling_involved_type	general_zoning_classification	Total_area	type_of_road	property_general_shape	property_F
0	60.0	RL	8450.0	Pave	Reg	
1	20.0	RL	9600.0	Pave	Reg	
2	60.0	RL	11250.0	Pave	IR1	
3	70.0	RL	9550.0	Pave	IR1	
4	60.0	RL	14260.0	Pave	IR1	

```
## Let's drop finished columns
df_n_c = df_n.copy()
df_n_c.head()
```

	dwelling_involved_type	general_zoning_classification	Total_area	type_of_road	property_general_shape	property_F
0	60.0	RL	8450.0	Pave	Reg	
1	20.0	RL	9600.0	Pave	Reg	
2	60.0	RL	11250.0	Pave	IR1	
3	70.0	RL	9550.0	Pave	IR1	
4	60.0	RL	14260.0	Pave	IR1	

```
df_n_c.drop(['finish_percentage_of_Bsmt', 'Unfinished_percentage_of_Bsmt','1stFlrSF', '2ndFlrSF','BsmtFinSF2','Total_area'],
df_n_c.head()
```

	dwelling_involved_type	general_zoning_classification	type_of_road	property_general_shape	property_Flatness	uti
0	60.0	RL	Pave	Reg	Lvl	
1	20.0	RL	Pave	Reg	Lvl	
2	60.0	RL	Pave	IR1	Lvl	
3	70.0	RL	Pave	IR1	Lvl	
4	60.0	RL	Pave	IR1	Lvl	

```
df_n_c.shape
```

```
(1102, 73)
```

```
df_n_c['dwelling_involved_type'].value_counts()
```

```
20.0     418
60.0     227
50.0     105
120.0     76
160.0     55
80.0      49
70.0      47
30.0      43
90.0      23
190.0     16
85.0      16
75.0      11
45.0       9
180.0      4
40.0       3
Name: dwelling_involved_type, dtype: int64
```

```
## let's rename those values into original categorical names from description

#         20  1-STORY 1946 & NEWER ALL STYLES
#         30  1-STORY 1945 & OLDER
#         40  1-STORY W/FINISHED ATTIC ALL AGES
#         45  1-1/2 STORY - UNFINISHED ALL AGES
#         50  1-1/2 STORY FINISHED ALL AGES
#         60  2-STORY 1946 & NEWER
#         70  2-STORY 1945 & OLDER
#         75  2-1/2 STORY ALL AGES
#         80  SPLIT OR MULTI-LEVEL
#         85  SPLIT FOYER
#         90  DUPLEX - ALL STYLES AND AGES
#        120  1-STORY PUD (Planned Unit Development) - 1946 & NEWER
#        150  1-1/2 STORY PUD - ALL AGES
#        160  2-STORY PUD - 1946 & NEWER
#        180  PUD - MULTILEVEL - INCL SPLIT LEV/FOYER
#        190  2 FAMILY CONVERSION - ALL STYLES AND AGES

di = {20: "1-STORY 1946 & NEWER ALL STYLES", 30: "1-STORY 1945 & OLDER",
      40: "1-STORY W/FINISHED ATTIC ALL AGES", 45:"1-1/2 STORY - UNFINISHED ALL AGES", 50:"1-1/2 STORY FINISHED ALL AGES",
      40:"1-STORY W/FINISHED ATTIC ALL AGES" ,45:"1-1/2 STORY - UNFINISHED ALL AGES" ,50:"1-1/2 STORY FINISHED ALL AGES" ,
      60:"2-STORY 1946 & NEWER" ,70:"2-STORY 1945 & OLDER" ,
      75:"2-1/2 STORY ALL AGES" ,80:"SPLIT OR MULTI-LEVEL" ,
      85:"SPLIT FOYER" ,90:"DUPLEX - ALL STYLES AND AGES" ,
      120:"1-STORY PUD (Planned Unit Development) - 1946 & NEWER" , 150:"1-1/2 STORY PUD - ALL AGES" ,
      160:"2-STORY PUD - 1946 & NEWER" , 180:"PUD - MULTILEVEL - INCL SPLIT LEV/FOYER" ,
      190: "2 FAMILY CONVERSION - ALL STYLES AND AGES" }

df_n_c.replace({"dwelling_involved_type": di}, inplace=True)

df_n_c.head()
```

	dwelling_involved_type	general_zoning_classification	type_of_road	property_general_shape	property_Flatness	uti
0	2-STORY 1946 & NEWER	RL	Pave	Reg	Lvl	
1	1-STORY 1946 & NEWER ALL STYLES	RL	Pave	Reg	Lvl	
2	2-STORY 1946 & NEWER	RL	Pave	IR1	Lvl	
3	2-STORY 1945 & OLDER	RL	Pave	IR1	Lvl	
4	2-STORY 1946 & NEWER	RL	Pave	IR1	Lvl	

```
#       10  Very Excellent
#        9  Excellent
#        8  Very Good
#        7  Good
#        6  Above Average
#        5  Average
#        4  Below Average
#        3  Fair
#        2  Poor
#        1  Very Poor

di_2 = {10: "Very Excellent", 9: "Excellent",
      8: "very good", 7:"good" ,6:"above average" ,
      5:"average" ,4:"below average" ,
      3:"fair" ,2:"poor" ,
      1:"very poor"}

df_n_c.replace({"OverallQual": di_2}, inplace=True)
df_n_c.replace({"OverallCond": di_2}, inplace=True)
df_n_c.head()
```

	dwelling_involved_type	general_zoning_classification	type_of_road	property_general_shape	property_Flatness	uti
0	2-STORY 1946 & NEWER	RL	Pave	Reg	Lvl	
1	1-STORY 1946 & NEWER ALL STYLES	RL	Pave	Reg	Lvl	
2	2-STORY 1946 & NEWER	RL	Pave	IR1	Lvl	
3	2-STORY 1945 & OLDER	RL	Pave	IR1	Lvl	
4	2-STORY 1946 & NEWER	RL	Pave	IR1	Lvl	

Let's look what are these columns means

- dwelling_involved_type (done)
- LowQualAreaSF (done)
- MasVnrArea (done)
- WoodDeckSF (done)
- OpenPorchSF (done)
- PoolArea (done)
- OverallQual (done)

- OverallCond (done)
- TotalBsmtSF
- GrLivArea
- EnclosedPorch
- three_season_porch_area
- ScreenPorch
- other_features_values
- LotFrontage

```
df_n_c['WoodDeck_exist'] = df_n_c['WoodDeckSF'].apply(lambda x: 0 if x == 0 else 1) # if there's a WoodDeck or not
df_n_c['OpenPorch_exist'] = df_n_c['OpenPorchSF'].apply(lambda x: 0 if x == 0 else 1) # if there's a OpenPorch or not
```

```
df_n_c['YrSold'].value_counts()
```

```
2007.0    254
2009.0    253
2006.0    242
2008.0    222
2010.0    131
Name: YrSold, dtype: int64
```

```
df_n_c.head()
```

```
    dwelling involved type, general zoning classification, type of road, property general shape, property Flatness, uti
```

```
df_n_c['LowQualFinSF'].value_counts()
```

```
    0.0      1088
    360.0       2
    80.0        2
    528.0       1
    144.0       1
    390.0       1
    420.0       1
    473.0       1
    156.0       1
    232.0       1
    481.0       1
    120.0       1
    397.0       1
    Name: LowQualFinSF, dtype: int64
```

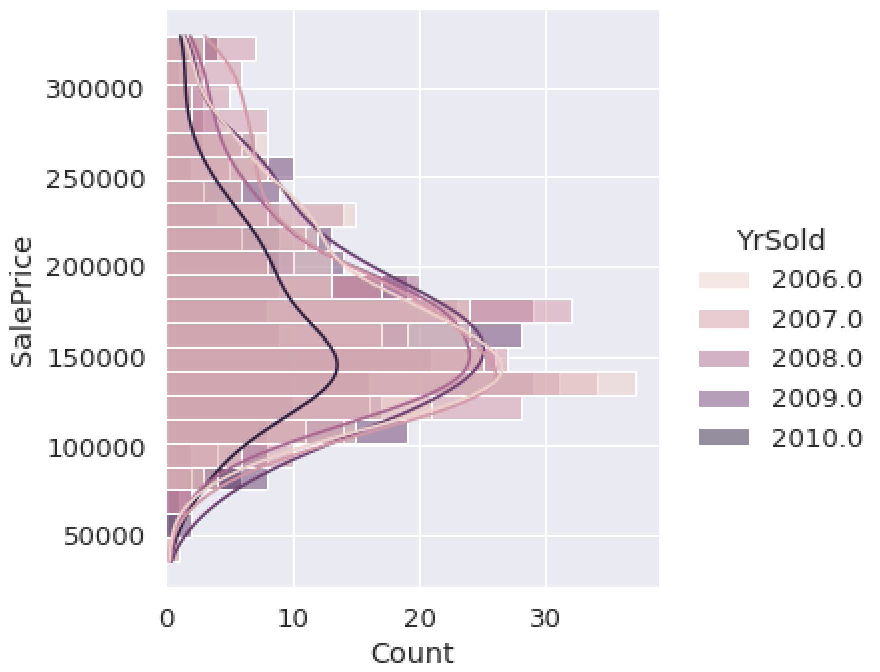
```
df_n_c['MasVnrArea'].value_counts()
```

```
    0.0       644
    108.0       8
    72.0        8
    180.0       8
    16.0        6
             ...
    584.0       1
    1129.0      1
    250.0       1
    292.0       1
    428.0       1
    Name: MasVnrArea, Length: 263, dtype: int64
```

```
df_n_c['masonry_veneer_exist'] = df_n_c['MasVnrArea'].apply(lambda x: 0 if x == 0 else 1) # if there's a masonry veneer or no
# df_n_c['LowQualFin_percentage'] = df_n_c['LowQualFinSF']/df_n['Total_area'] #Percentage of low quality area
df_n_c['Low_Quality_areas_existance'] = df_n_c['LowQualFinSF'].apply(lambda x: 0 if x == 0 else 1) # if there's a low quality
```

```
sns.displot(data=df_n_c, y="SalePrice", kde=True, hue="YrSold")
```

```
<seaborn.axisgrid.FacetGrid at 0x7fe0975e14d0>
```



```
df_n_c.to_csv("house_price_pred.csv", encoding= 'UTF-8', index = False)
```

```
df_n_c['WoodDeck_exist'] = df_n_c['WoodDeck_exist'].apply(lambda x: "doesn't exist" if x == 0 else "exist") # if there's a Wo
df_n_c['OpenPorch_exist'] = df_n_c['OpenPorch_exist'].apply(lambda x: "doesn't exist" if x == 0 else "exist") # if there's a
df_n_c['Is_diff'] = df_n_c['Is_diff'].apply(lambda x: "No difference" if x == 0 else "difference") # if there's a year_diff o
df_n_c['Pool_exist'] = df_n_c['Pool_exist'].apply(lambda x: "doesn't exist" if x == 0 else "exist") # if there's a pool or no
df_n_c['2ndFlr_exist'] = df_n_c['2ndFlr_exist'].apply(lambda x: "doesn't exist" if x == 0 else "exist") # if there's 2ndFlr o
df_n_c['masonry_veneer_exist'] = df_n_c['masonry_veneer_exist'].apply(lambda x: "doesn't exist" if x == 0 else "exist") # if
df_n_c['Low_Quality_areas_existance'] = df_n_c['Low_Quality_areas_existance'].apply(lambda x: "no low quality" if x == 0 else


di_3 = {1.0: "Jan", 2.0: "Feb",
      3.0: "Mar", 4.0:"Apr" ,5.0:"May" ,
      6.0:"Jun" ,7.0:"Jul" ,
      8.0:"Aug" ,9.0:"Sep" ,
      10.0:"Oct",11.0:"Nov", 12.0:"Dec"}
```

```
di_4 = {2006.0: "2006", 2007.0: "2007",
      2008.0: "2008", 2009.0:"2009" ,2010.0:"2010"}

df_n_c.replace({"MoSold": di_3}, inplace=True)
df_n_c.replace({"YrSold": di_4}, inplace=True)
df_n_c.head()
```

	dwelling_involved_type	general_zoning_classification	type_of_road	property_general_shape	property_Flatness	uti
0	2-STORY 1946 & NEWER	RL	Pave	Reg	Lvl	
1	1-STORY 1946 & NEWER ALL STYLES	RL	Pave	Reg	Lvl	
2	2-STORY 1946 & NEWER	RL	Pave	IR1	Lvl	
3	2-STORY 1945 & OLDER	RL	Pave	IR1	Lvl	
4	2-STORY 1946 & NEWER	RL	Pave	IR1	Lvl	

```
for col in df_n_c.select_dtypes('object').columns:
    print(col)
    print(df_n_c[col].unique())
    print('_'*50)
```

```
dwelling_involved_type
['2-STORY 1946 & NEWER' '1-STORY 1946 & NEWER ALL STYLES'
 '2-STORY 1945 & OLDER' '1-1/2 STORY FINISHED ALL AGES'
 '2 FAMILY CONVERSION - ALL STYLES AND AGES'
 '1-1/2 STORY - UNFINISHED ALL AGES'
 '1-STORY PUD (Planned Unit Development) - 1946 & NEWER'
 '1-STORY 1945 & OLDER' 'SPLIT FOYER' 'DUPLEX - ALL STYLES AND AGES'
 'SPLIT OR MULTI-LEVEL' '2-STORY PUD - 1946 & NEWER'
 '2-1/2 STORY ALL AGES' 'PUD - MULTILEVEL - INCL SPLIT LEV/FOYER'
 '1-STORY W/FINISHED ATTIC ALL AGES']
__________________________________________________
general_zoning_classification
['RL' 'RM' 'Other']
__________________________________________________
type_of_road
['Pave' 'Grvl']
__________________________________________________
property_general_shape
['Reg' 'IR1' 'Other']
__________________________________________________
property_Flatness
['Lvl' 'Other']
__________________________________________________
utilities_types
['AllPub' 'NoSeWa']
__________________________________________________
LotConfig
['Inside' 'Other']
__________________________________________________
LandSlope
['Gtl' 'Other']
__________________________________________________
Neighborhood
['CollgCr' 'Veenker' 'Crawfor' 'NoRidge' 'Mitchel' 'Somerst' 'NWAmes'
 'OldTown' 'BrkSide' 'Sawyer' 'NAmes' 'SawyerW' 'NridgHt' 'IDOTRR'
 'MeadowV' 'Timber' 'Gilbert' 'ClearCr' 'Edwards' 'NPkVill' 'StoneBr'
 'Blmngtn' 'BrDale' 'SWISU' 'Blueste']
__________________________________________________
dwelling_type
['1Fam' 'Other']
__________________________________________________
HouseStyle
['2Story' '1Story' '1.5Fin' 'Other']
__________________________________________________
OverallQual
['good' 'above average' 'very good' 'average' 'below average' 'Excellent'
 'fair' 'Very Excellent' 'poor']
__________________________________________________
OverallCond
['average' 'very good' 'above average' 'good' 'below average' 'fair'
 'Excellent' 'poor']
```

```
________________________________________________
RoofStyle
['Gable' 'Hip' 'Other']

________________________________________________
roof_material
['CompShg' 'Other']
```

```
df_n_c.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1102 entries, 0 to 1101
Data columns (total 77 columns):
 #   Column                           Non-Null Count  Dtype  
---  ------                           --------------  -----  
 0   dwelling_involved_type           1102 non-null   object 
 1   general_zoning_classification    1102 non-null   object 
 2   type_of_road                     1102 non-null   object 
 3   property_general_shape           1102 non-null   object 
 4   property_Flatness                1102 non-null   object 
 5   utilities_types                  1102 non-null   object 
 6   LotConfig                        1102 non-null   object 
 7   LandSlope                        1102 non-null   object 
 8   Neighborhood                     1102 non-null   object 
 9   dwelling_type                    1102 non-null   object 
 10  HouseStyle                       1102 non-null   object 
 11  OverallQual                      1102 non-null   object 
 12  OverallCond                      1102 non-null   object 
 13  RoofStyle                        1102 non-null   object 
 14  roof_material                    1102 non-null   object 
 15  exterior_covering_1              1102 non-null   object 
 16  exterior_covering_2              1102 non-null   object 
 17  masonry_veneer_type              1102 non-null   object 
 18  MasVnrArea                       1102 non-null   float64
 19  ExterQual                        1102 non-null   object 
 20  ExterCond                        1102 non-null   object 
 21  Foundation                       1102 non-null   object 
 22  BsmtQual                         1102 non-null   object 
 23  BsmtCond                         1102 non-null   object 
 24  BsmtExposure                     1102 non-null   object 
 25  BsmtFinType1                     1102 non-null   object 
 26  BsmtFinType2                     1102 non-null   object 
 27  TotalBsmtSF                               1102 non-null   float64
 28  Heating                                   1102 non-null   object
 29  HeatingQC                                 1102 non-null   object
 30  CentralAir                                1102 non-null   object
 31  electrical_system                         1102 non-null   object
 32  LowQualFinSF                              1102 non-null   float64
 33  GrLivArea                                 1102 non-null   float64
 34  BsmtFullBath                              1102 non-null   float64
 35  BsmtHalfBath                              1102 non-null   float64
 36  FullBath                                  1102 non-null   float64
 37  HalfBath                                  1102 non-null   float64
 38  BedroomAbvGr                              1102 non-null   float64
 39  KitchenAbvGr                              1102 non-null   float64
 40  KitchenQual                               1102 non-null   object
 41  total_rooms_above_grade                   1102 non-null   float64
 42  Functional                                1102 non-null   object
 43  Fireplaces                                1102 non-null   float64
 44  GarageType                                1102 non-null   object
 45  GarageYrBlt                               1102 non-null   float64
 46  interior_finish_garage                    1102 non-null   object
 47  garage_car_capacity                       1102 non-null   float64
 48  GarageArea                                1102 non-null   float64
 49  GarageQual                                1102 non-null   object
 50  GarageCond                                1102 non-null   object
 51  PavedDrive                                1102 non-null   object
```

```
for col in df_n_c.select_dtypes('float64').columns:
    print(col)
```

```
MasVnrArea
TotalBsmtSF
LowQualFinSF
GrLivArea
BsmtFullBath
BsmtHalfBath
FullBath
HalfBath
BedroomAbvGr
KitchenAbvGr
total_rooms_above_grade
Fireplaces
```

```
GarageYrBlt
garage_car_capacity
GarageArea
WoodDeckSF
OpenPorchSF
EnclosedPorch
three_season_porch_area
ScreenPorch
PoolArea
other_features_values
SalePrice
year_diff
LotFrontage
```

```
df_dumm = pd.get_dummies(df_n_c, columns = df_n_c.select_dtypes('object').columns,drop_first = True)
```

```
df_dumm = pd.get_dummies(df_dumm, columns = df_dumm.select_dtypes('category').columns,drop_first = True)
```

```
df_dumm.shape
```

```
(1102, 174)
```

Now let's drop areas

- GarageArea
- WoodDeckSF
- OpenPorchSF
- EnclosedPorch
- three_season_porch_area
- PoolArea
- ScreenPorch
- GrLivArea
- LowQualFinSF

- TotalBsmtSF
- MasVnrArea

```
df_n_c.columns
```

```
Index(['dwelling_involved_type', 'general_zoning_classification',
       'type_of_road', 'property_general_shape', 'property_Flatness',
       'utilities_types', 'LotConfig', 'LandSlope', 'Neighborhood',
       'dwelling_type', 'HouseStyle', 'OverallQual', 'OverallCond',
       'RoofStyle', 'roof_material', 'exterior_covering_1',
       'exterior_covering_2', 'masonry_veneer_type', 'MasVnrArea', 'ExterQual',
       'ExterCond', 'Foundation', 'BsmtQual', 'BsmtCond', 'BsmtExposure',
       'BsmtFinType1', 'BsmtFinType2', 'TotalBsmtSF', 'Heating', 'HeatingQC',
       'CentralAir', 'electrical_system', 'LowQualFinSF', 'GrLivArea',
       'BsmtFullBath', 'BsmtHalfBath', 'FullBath', 'HalfBath', 'BedroomAbvGr',
       'KitchenAbvGr', 'KitchenQual', 'total_rooms_above_grade', 'Functional',
       'Fireplaces', 'GarageType', 'GarageYrBlt', 'interior_finish_garage',
       'garage_car_capacity', 'GarageArea', 'GarageQual', 'GarageCond',
       'PavedDrive', 'WoodDeckSF', 'OpenPorchSF', 'EnclosedPorch',
       'three_season_porch_area', 'ScreenPorch', 'PoolArea',
       'other_features_values', 'MoSold', 'YrSold', 'SaleType',
       'SaleCondition', 'SalePrice', 'year_diff', 'Is_diff', 'LotFrontage',
       'Condition_all', 'Bsmt Exposure', 'Pool_exist', '2ndFlr_exist',
       'quantile_ranges_of_areas',
       'quantile_ranges_of_basement_finished_areas', 'WoodDeck_exist',
       'OpenPorch_exist', 'masonry_veneer_exist',
       'Low_Quality_areas_existance'],
      dtype='object')
```

Porch means شرفه او بلكونة

A three season room and a four season room may look similar at first glance, but the main distinguishing factors between the two are the framing system and glass used. The frame of a four season room is thermally engineered so the room can be heated and cooled cost effectively. Since it can be temperature controlled, it can be used year-round, regardless of the weather. Depending on your location, a three season room is typically only used in the spring, summer, and fall, when outside temperatures are mild. However, if you reside in a mild climate, a three season room may be perfect for you. It really depends on how you plan to use the room.

Above Grade means

In real estate, above grade means the portion of a home that is above the ground. The term is usually used to describe a room or square footage. For example, 3 bedrooms above grade means 3 bedrooms that are not in a basement

Full bathroom vs half bathroom

A full bathroom is made up of four parts: a sink, a shower, a bathtub, and a toilet. Anything less than that, and you can't officially consider it a full bath.

A half bathroom is a bathroom that does not contain a bath or a shower, just a toilet and sink

```
df_dumm['three_enteries_exist'] = df_dumm['three_season_porch_area'].apply(lambda x: "doesn't exist" if x == 0 else "exist")
df_dumm['Open_Porch_exist'] = df_dumm['OpenPorchSF'].apply(lambda x: "doesn't exist" if x == 0 else "exist") # if there's an
df_dumm['Screen_Porch_exist'] = df_dumm['ScreenPorch'].apply(lambda x: "doesn't exist" if x == 0 else "exist")
```

```
df_dumm['Garage_exist'] = df_dumm['GarageArea'].apply(lambda x: "doesn't exist" if x == 0 else "exist")
```

```
df_dumm['GarageYrBlt'].value_counts()
```

```
2005.0    53
2004.0    43
2006.0    42
2003.0    36
2007.0    34
          ..
1927.0     1
1906.0     1
1900.0     1
2010.0     1
1934.0     1
Name: GarageYrBlt, Length: 93, dtype: int64
```

```
df_dumm['Garage_exist'].value_counts()
```

```
     exist    1102
     Name: Garage_exist, dtype: int64
```

GrLivArea

```
## GrLivArea:  We could just make a new column to check if it was above mean or not
df_dumm.drop(['GrLivArea'], axis = 1, inplace = True)
```

```
df_dumm.drop(['GarageArea','WoodDeckSF','OpenPorchSF','three_season_porch_area', 'PoolArea','ScreenPorch', 'LowQualFinSF','T
```

```
df_dumm['EnclosedPorch'].value_counts()
```

```
     0.0      951
     112.0     12
     120.0      5
     192.0      4
     96.0       4
             ...
     189.0      1
     293.0      1
     239.0      1
     67.0       1
     123.0      1
     Name: EnclosedPorch, Length: 95, dtype: int64
```

```
df_dumm['Enclosed Porch exist'] = df_dumm['EnclosedPorch'].apply(lambda x: "doesn't exist" if x == 0 else "exist")
```

```
df_dumm.drop(['LotFrontage','EnclosedPorch','GarageYrBlt','Garage_exist'],axis = 1, inplace = True)
```

```
for col in df_dumm.select_dtypes('object').columns:
    print(col)
    print(df_dumm[col].unique())
    print('_'*50)
```

```
     three_enteries_exist
```

```
["doesn't exist" 'exist']
_________________________________________________
Open_Porch_exist
['exist' "doesn't exist"]
_________________________________________________
Screen_Porch_exist
["doesn't exist" 'exist']
_________________________________________________
Enclosed Porch exist
["doesn't exist" 'exist']
_________________________________________________
```

```
df_dumm = pd.get_dummies(df_dumm, columns = df_dumm.select_dtypes('object').columns,drop_first = True)
df_dumm.head()
```

	BsmtFullBath	BsmtHalfBath	FullBath	HalfBath	BedroomAbvGr	KitchenAbvGr	total_rooms_above_grade	Fireplaces	gar
0	1.0	0.0	2.0	1.0	3.0	1.0	8.0	0.0	
1	0.0	1.0	2.0	0.0	3.0	1.0	6.0	1.0	
2	1.0	0.0	2.0	1.0	3.0	1.0	6.0	1.0	
3	1.0	0.0	1.0	0.0	3.0	1.0	7.0	1.0	
4	1.0	0.0	2.0	1.0	4.0	1.0	9.0	1.0	

```
df_dumm.shape
```

```
(1102, 165)
```

```
df_dumm.to_csv("house_price_pred_dummies(ready_to_split).csv", encoding= 'UTF-8', index = False)
```