Question 1

What is the optimal value of alpha for ridge and lasso regression? What will be the changes in the model if you choose double the value of alpha for both ridge and lasso? What will be the most important predictor variables after the change is implemented?

The optimal value of alpha for ridge is 500 and for lisso is 1000. The R2Score at this alpha is between 78% to 79% on test samples.

When we double the alpha value for both ridge and lisso, R2Score is going down between 75 to 76% which says poor efficiency of model compare to the one with optimal alpha value.

There are many predictor variables whose values are getting changed huge. Also some feature we can eliminate as well. This is subjective and it depends on individual choice.

Question 2

You have determined the optimal value of lambda for ridge and lasso regression during the assignment. Now, which one will you choose to apply and why?

I choose to apply lasso regression model because it would help for feature elimination and model will be robust.

Question 3

After building the model, you realised that the five most important predictor variables in the lasso model are not available in the incoming data. You will now have to create another model excluding the five most important predictor variables. Which are the five most important predictor variables now?

1. MSZoning
2. LotConfig
3. Condition1
4. Condition2
5. ExterCond

These five variables we can eliminate as coeff is zero.

Question 4

How can you make sure that a model is robust and generalisable? What are the implications of the same for the accuracy of the model and why?

We split original data into two parts. One is for training purpose where we build model and another is for test purpose where we apply model on test data to find out accuracy. If we get almost same accuracy for both test and train data, then we can say that its robust and generalise model.

Ridge

```
[ -796.00906396  4249.78315495 -2376.76654972  1069.30412725
  -603.14610566  1020.19870426    64.10961337  -263.29228911
 -3701.06392417  -672.67421694 12130.94964725   791.83695388
  3936.09486487  3238.04698466  3394.13471386  -130.05366932
  -299.19161653 -2117.98321932 -7195.60373919   570.49146472
  3009.44648785 -8019.96057668   632.43571402 -3291.46526446
 -1427.93347307  -138.5728384  -2883.05663471  1423.39439814
   700.59367812  3904.41718198   140.14631905  7421.85216047
  3652.22611185  4250.77808809    29.19074354 -7713.34004681
  1793.42763654  5226.89586125 -5222.55502717 -2694.43866362
 -4241.57545336   157.95987588   469.93152681  1407.34393133
  3491.27697242  2240.86826194    76.18386861   812.26551292
  1280.92694704  1449.72894115  -378.03659188   -52.77713518
 -1079.04106522  -513.43108946  1272.01480996]
```

```
-599.21351736  4741.1649488  -2394.57070502  1763.37688894
  -484.66450632  1270.61470749  -114.55920431  -511.93450718
 -5028.924285   -1903.22175153 15224.08522533  1598.82356767
  3776.41307347  3637.68335153  4332.89963434  -501.92865003
  -740.73143371 -2029.86611021 -7660.1891566    563.06664242
  3064.53536459 -9198.63233239   916.74275697 -3625.42588775
 -1735.08971174   -97.98960599 -2536.4190542   1166.23812477
   122.01714833  4904.68522735   295.3456335   8723.56495861
  4366.58889508  5260.0672164    476.11356563 -8662.44577514
  2065.40864685  5326.35901461 -5263.93572141 -2155.36598325
 -3902.51210768   190.33787708   463.85923844  1451.26339065
  3623.21814535  1894.96086308   316.93039543   955.21063167
  1421.06643062  1477.17748449  -438.60589272  -306.5993758
 -1525.0763117   -578.60678415  1197.21123424]
```

Lisso

```
    -0.        ,   5373.37311569,  -1304.21074475,    785.22690549,
           -0.        ,      0.        ,     -0.        ,     -0.
,
       -6035.1393503 ,   -530.47648789,  28047.15033678,    228.118615
31,
        1357.84014978,   2514.1773442 ,   3856.93168494,     -0.
,
        -225.43175093,     -0.        ,  -6313.15527054,      0.
,
        1648.48403556, -10005.91424956,    174.46053002,  -2078.581588
73,
       -2089.64506237,     -0.        ,     -0.        ,    273.057374
16,
           0.        ,   6025.47595701,      0.        ,   9687.211461
09,
        3450.28207406,   4445.98755804,      0.        ,  -9111.767366
45,
          71.70528027,   5142.87843868,  -3596.81154913,   -818.688601
3 ,
       -2960.41947324,      0.        ,      0.        ,    421.484358
03,
        2929.03410158,      0.        ,     -0.        ,      0.
,
           0.        ,      0.        ,     -0.        ,     -0.
,
         -59.2790318 ,     -0.        ,      0.        ])
array([-0.00000000e+00,  5.22861890e+03, -1.76476149e+03,  2.22997068e+
03,
       -0.00000000e+00,  8.78937763e+02, -0.00000000e+00, -0.00000000e+
00,
       -7.00465412e+03, -3.27765172e+03,  2.68957702e+04,  1.88393447e+
03,
        1.68860624e+03,  3.26251502e+03,  4.89963965e+03, -1.20350211e+
02,
       -1.48726772e+03, -7.90162474e+02, -6.28464864e+03,  0.00000000e+
00,
        2.69416735e+03, -1.04621229e+04,  9.23065991e+02, -3.23084949e+
03,
       -2.19354877e+03, -0.00000000e+00, -5.13133139e+02,  2.50875908e+
00,
```

```
       -0.00000000e+00,  6.84628519e+03,  3.80876086e+02,  1.08737037e+
04,
        4.99043141e+03,  5.47766685e+03,  0.00000000e+00, -9.48586002e+
03,
        1.00335661e+03,  4.91923125e+03, -3.94410128e+03, -5.05975014e+
02,
       -2.58271707e+03,  0.00000000e+00,  0.00000000e+00,  9.66937221e+
02,
        3.01991567e+03,  0.00000000e+00, -0.00000000e+00,  4.81650974e+
02,
        4.10513522e+02,  0.00000000e+00, -0.00000000e+00, -0.00000000e+
00,
       -1.23106831e+03, -0.00000000e+00,  0.00000000e+00])
```