# Lesson 4: Penalization Methods

- Ridge Regression

```
from sklearn.linear_model import Ridge
ridge_reg = Ridge(alpha=0.5)
ridge_reg.fit(x_train, y_train)
```

- Feature Selection and Lasso Regression

```
from sklearn.linear_model import Lasso
lasso_reg = Lasso(alpha=0.001)
lasso_reg.fit(x_train, y_train)
```

```
#comparing the effects of regularisation
def get_weights_df(model, feat, col_name):
  #this function returns the weight of every feature
  weights = pd.Series(model.coef_, feat.columns).sort_values()
  weights_df = pd.DataFrame(weights).reset_index()
  weights_df.columns = ['Features', col_name]
  weights_df[col_name].round(3)
  return weights_df

linear_model_weights = get_weights_df(model, x_train, 'Linear_Model_Weight')
ridge_weights_df = get_weights_df(ridge_reg, x_train, 'Ridge_Weight')
lasso_weights_df = get_weights_df(lasso_reg, x_train, 'Lasso_weight')

final_weights = pd.merge(linear_model_weights, ridge_weights_df, on='Features')
final_weights = pd.merge(final_weights, lasso_weights_df, on='Features')
```

| Features | Linear_Model_Weight | Ridge_Weight | Lasso_weight |
|---|---|---|---|
| Surface Area | -208535169648.890289 | -0.062275 | 0.000000 |
| Relative Compactness | -64.612863 | -0.283471 | -0.027719 |
| Orientation | -0.023080 | 0.003369 | 0.000000 |

| | | | |
|---|---|---|---|
| Glazing Area Distribution | 0.203771 | 0.029088 | 0.021431 |
| Overall Height | 4.170480 | 0.442467 | 0.463482 |
| Glazing Area | 19.931923 | 0.212449 | 0.206132 |
| Wall Area | 208535169648.863983 | 0.103061 | 0.200087 |
| Roof_Area | 417070339297.606750 | -0.163192 | -0.000000 |