Linear Regression and Boston Data Set

- Load Boston Data Set from `sklearn.datasets` , use

```
from sklearn.datasets import load_boston
boston = load_boston()
```

- Assign `data` to `X` and `target` to `y`

In [4]:
```
from sklearn.datasets import load_boston
boston = load_boston()
```

In [5]:
```
X, y = boston.data, boston.target
```

- Check the shape of the dataset

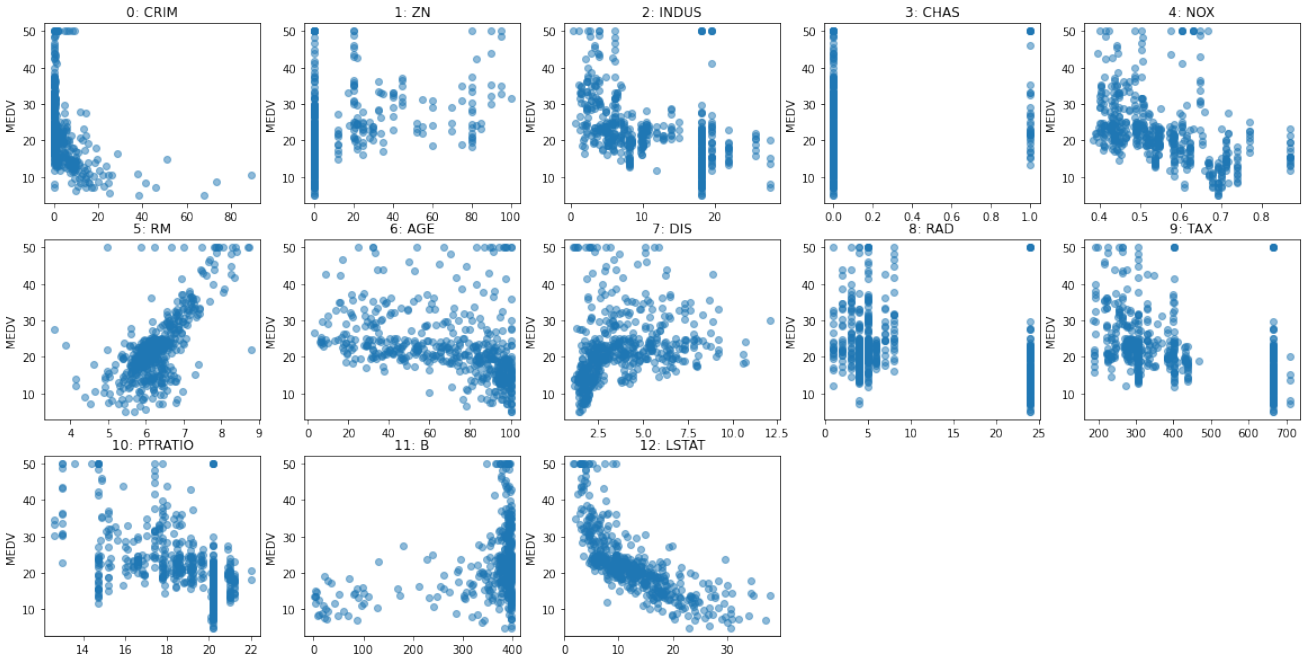
In [6]:
```
X.shape
```

Out[6]:
```
(506, 13)
```

- Plot the scatter plot of each attribute versus `MEDV`
- You can use the starter code below

```
fig, axes = plt.subplots(3, 5, figsize=(20, 10))
for i, ax in enumerate(axes.ravel()):
    if i > 12:
        ax.set_visible(False)
        continue
```

In [139…
```
fig, axes = plt.subplots(3, 5, figsize=(20, 10))
for i, ax in enumerate(axes.ravel()):
    if i > 12:
        ax.set_visible(False)
        continue
    ax.plot(X[:, i], y, 'o', alpha=.5)
    ax.set_title("{}: {}".format(i, boston.feature_names[i]))
    ax.set_ylabel("MEDV")
```



In [140…
```
print(X.shape)
print(y.shape)
```

```
(506, 13)
(506,)
```

In [141…
```
X.shape
```

Out[141… `(506, 13)`

- Split the dataset into test and train datasets, you can set the random seed to 42 by `random_state=42`

In [7]:
```
from sklearn.model_selection import train_test_split
from sklearn.preprocessing import scale
from sklearn.impute import SimpleImputer
X_train, X_test, y_train, y_test = train_test_split(X, y, random_state=42)
```

- run cross validation for the train and test datasets for `cv=10`
- print the mean score for the cross validation using linear regressor (`LinearRegressor()`)
- do the same two steps above for random forest regressor. For that you can import `from sklearn.ensemble import RandomForestRegressor`

In [143…
```
np.mean(cross_val_score(LinearRegression(), X_train, y_train, cv=10))
```

Out[143… `0.7160133196648378`

In [144…
```
from sklearn.ensemble import RandomForestRegressor
np.mean(cross_val_score(RandomForestRegressor(), X_train, y_train, cv=10))
```

Out[144…
```
0.8439065903973452
```

In [ ]:

Boston Housing Data with Polynomials

- Transform the Boston House dataset and split the dataset into test and train datasets
- Run cross validation
- Plot the coefficients of the model

In [159…
```
from sklearn.preprocessing import PolynomialFeatures, StandardScaler, scale
from sklearn.impute import SimpleImputer
from sklearn.datasets import load_boston
from sklearn.model_selection import train_test_split

boston = load_boston()
X, y = boston.data, boston.target
#X, y = data.data, data.target

X_poly = PolynomialFeatures(include_bias=False).fit_transform(SimpleImputer()
print(X_poly.shape)
X_poly_train, X_poly_test, y_train, y_test = train_test_split(X_poly, y, rand
```

```
(506, 104)
```

In [ ]:

In [18]:
```
from sklearn.preprocessing import PolynomialFeatures,StandardScaler, scale
from sklearn.impute import SimpleImputer
from sklearn.datasets import load_boston
from sklearn.model_selection import train_test_split
from sklearn.pipeline import Pipeline

trans=Pipeline([
            ("poly", PolynomialFeatures(include_bias=False)),
            ("imputer", SimpleImputer()),
            ("scale", StandardScaler())
        ])
boston = load_boston()
X, y = boston.data, boston.target
#X, y = data.data, data.target
X_train, X_test, y_train, y_test = train_test_split(X, y, random_state=42)

X_poly_train = trans.fit_transform(X_train)
X_poly_test = trans.transform(X_test)
print(X_poly_train.shape)
```

```
(379, 104)
```

In [19]:
```
np.mean(cross_val_score(LinearRegression(), X_poly_train, y_train, cv=10))
```

Out[19]:
```
0.8065194743873981
```

In [ ]:
```
lr = LinearRegression().fit(X_poly_train, y_train)
plt.scatter(range(X_poly_train.shape[1]), lr.coef_, c=np.sign(lr.coef_), cmap
```