In [1]:
```
#required Libraries

import pandas as pd
import numpy as np
import seaborn as sns
import matplotlib.pyplot as plt
from sklearn.preprocessing import LabelEncoder
```

In [2]:
```
#reading the file
#give path if required

data = pd.read_csv("cubic_zirconia.csv")
```

In [3]:
```
data.drop(columns=['Unnamed: 0'], axis=1, inplace=True)
print(data.shape)
print(data.columns)
```

```
(26967, 10)
Index(['carat', 'cut', 'color', 'clarity', 'depth', 'table', 'x', 'y', 'z',
       'price'],
      dtype='object')
```

In [4]:
```
#The describe() method returns description of the data in the DataFrame.

data.describe()
```

Out[4]:

	carat	depth	table	x	y	z	
count	26967.000000	26270.000000	26967.000000	26967.000000	26967.000000	26967.000000	26967.0(
mean	0.798375	61.745147	57.456080	5.729854	5.733569	3.538057	3939.5
std	0.477745	1.412860	2.232068	1.128516	1.166058	0.720624	4024.8(
min	0.200000	50.800000	49.000000	0.000000	0.000000	0.000000	326.0(
25%	0.400000	61.000000	56.000000	4.710000	4.710000	2.900000	945.0(
50%	0.700000	61.800000	57.000000	5.690000	5.710000	3.520000	2375.0(
75%	1.050000	62.500000	59.000000	6.550000	6.540000	4.040000	5360.0(
max	4.500000	73.600000	79.000000	10.230000	58.900000	31.800000	18818.0(

In [5]:
```
#dropping duplicate rows

data.drop_duplicates(inplace=True)
print("Shape of data after dropping duplicate rows: ", data.shape)
```

```
Shape of data after dropping duplicate rows:  (26933, 10)
```

In [6]:
```
#data type of each column/feature

data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 26933 entries, 0 to 26966
```

```
Data columns (total 10 columns):
 #   Column   Non-Null Count  Dtype  
---  ------   --------------  -----  
 0   carat    26933 non-null  float64
 1   cut      26933 non-null  object 
 2   color    26933 non-null  object 
 3   clarity  26933 non-null  object 
 4   depth    26236 non-null  float64
 5   table    26933 non-null  float64
 6   x        26933 non-null  float64
 7   y        26933 non-null  float64
 8   z        26933 non-null  float64
 9   price    26933 non-null  int64  
dtypes: float64(6), int64(1), object(3)
memory usage: 2.3+ MB
```

In [7]:

```
#Checking the number of null vales in data
# Here, depth column has 697 null values

data.isnull().sum()
```

Out[7]:

```
carat        0
cut          0
color        0
clarity      0
depth      697
table        0
x            0
y            0
z            0
price        0
dtype: int64
```

In [8]:

```
#fill the null values using mean
#could also be done with help of median
#inplace=True is to make changes to same dataset

print("Mean: {:.2f} ".format(data['depth'].mean()))

data['depth'].fillna(data['depth'].mean(), inplace=True)#https://pythonguides.com/py
```

```
Mean: 61.75
```

In [9]:

```
#after calculation

data.isnull().sum()
```

Out[9]:

```
carat      0
cut        0
color      0
clarity    0
depth      0
table      0
x          0
y          0
z          0
price      0
dtype: int64
```

In [10]:

```
#checking for outliers

#as we know we have 7 numerical columns from data.info
#printing that columns
```

```
numerical=data.select_dtypes(include='number')
numerical_col=numerical.columns
print(numerical_col)
```

```
Index(['carat', 'depth', 'table', 'x', 'y', 'z', 'price'], dtype='object')
```

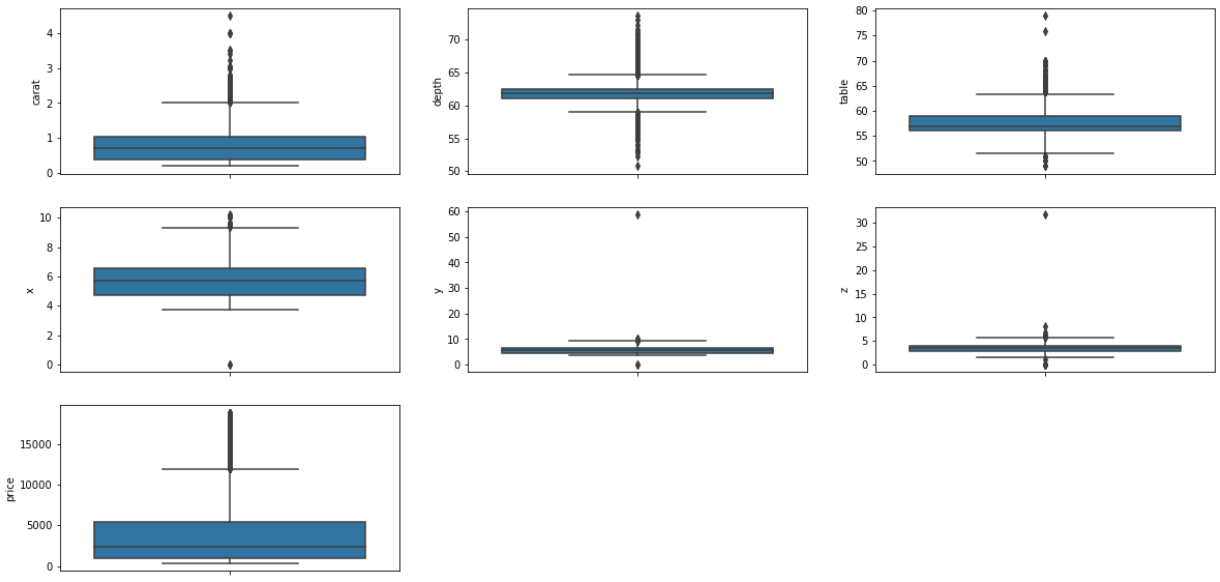
In [11]:

```
#get Interquartile range

for column in numerical_col:
    Q1 = data[column].quantile(0.25)
    Q3 = data[column].quantile(0.75)
    IQR = Q3 - Q1
    print('IQR of {} {:.2f}'.format(column,IQR))
```

```
IQR of carat 0.65
IQR of depth 1.40
IQR of table 3.00
IQR of x 1.84
IQR of y 1.83
IQR of z 1.14
IQR of price 4411.00
```

In [12]:

```
#plotting box-plots with outliers

plt.figure(figsize=(20,10))
counter=1
for column in numerical_col:
    plt.subplot(3,3,counter)
    sns.boxplot(y=data[column])
    counter=counter+1
```



In [13]:

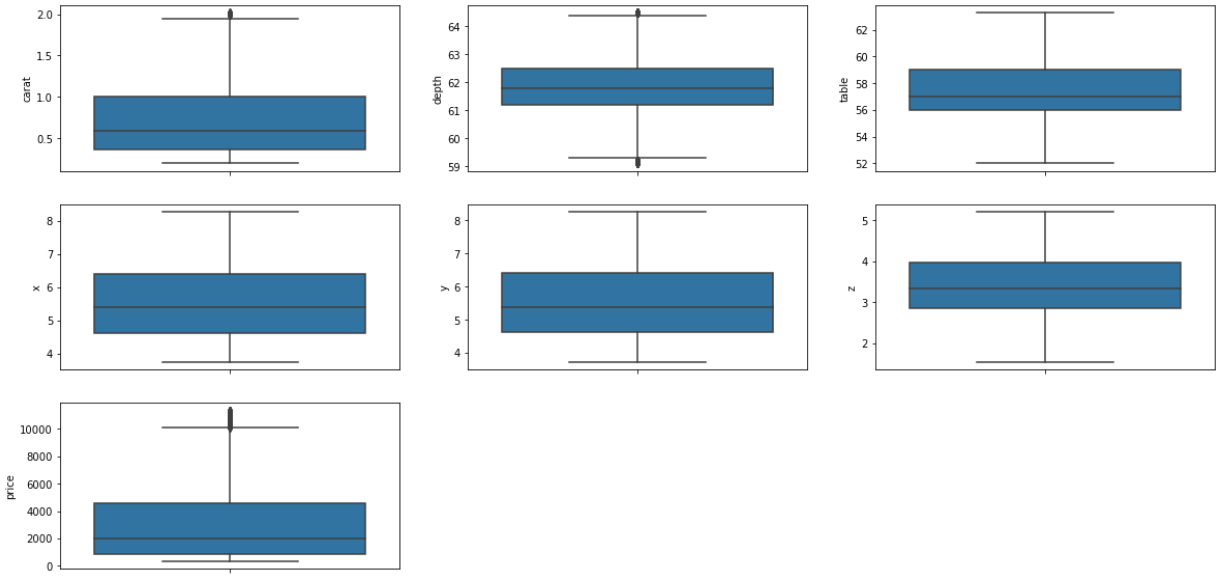
```
#Excluding Outliers

for column in numerical_col:
    Q1 = data[column].quantile(0.25)
    Q3 = data[column].quantile(0.75)
    IQR = Q3 - Q1

    lower_bound=Q1-1.5*IQR
    upper_bound=Q3+1.5*IQR
```

```
    data=data[(data[column]>lower_bound) & (data[column]<upper_bound)]
```

In [14]:
```
#shape of data after removing outliers

data.shape
```

Out[14]: (23271, 10)

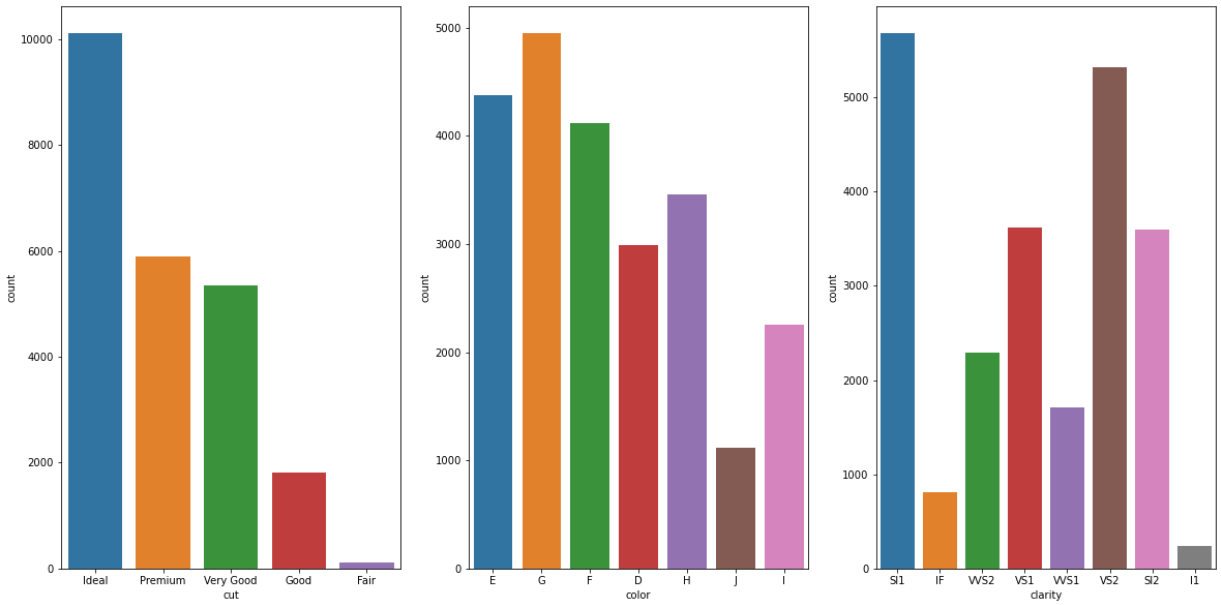
In [15]:
```
#plotting box-plots without outliers

plt.figure(figsize=(20,10))
counter=1
for column in numerical_col:
    plt.subplot(3,3,counter)
    sns.boxplot(y=data[column])
    counter=counter+1
```



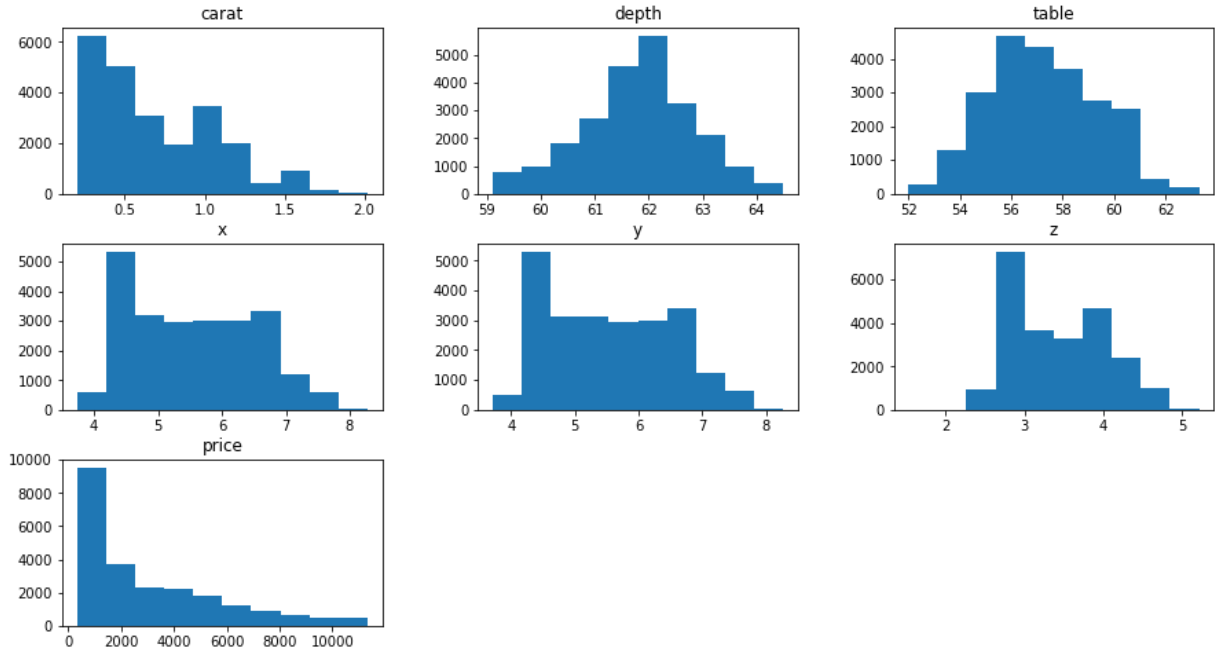
In [16]:
```
#categorical data


category=data.select_dtypes(exclude='number')
category_col=category.columns
print(category_col)
```

```
Index(['cut', 'color', 'clarity'], dtype='object')
```

In [17]:
```
#categorical data univariate

plt.figure(figsize=(20,10))
counter=1
for column in category_col:
    plt.subplot(1,3,counter)
    sns.countplot(x=data[column])
    counter=counter+1
```



In [18]:
```
#histograms

data[numerical_col].hist(figsize=(15, 8),grid=False)
plt.show()
```



Above you can see are right skewed distribution.

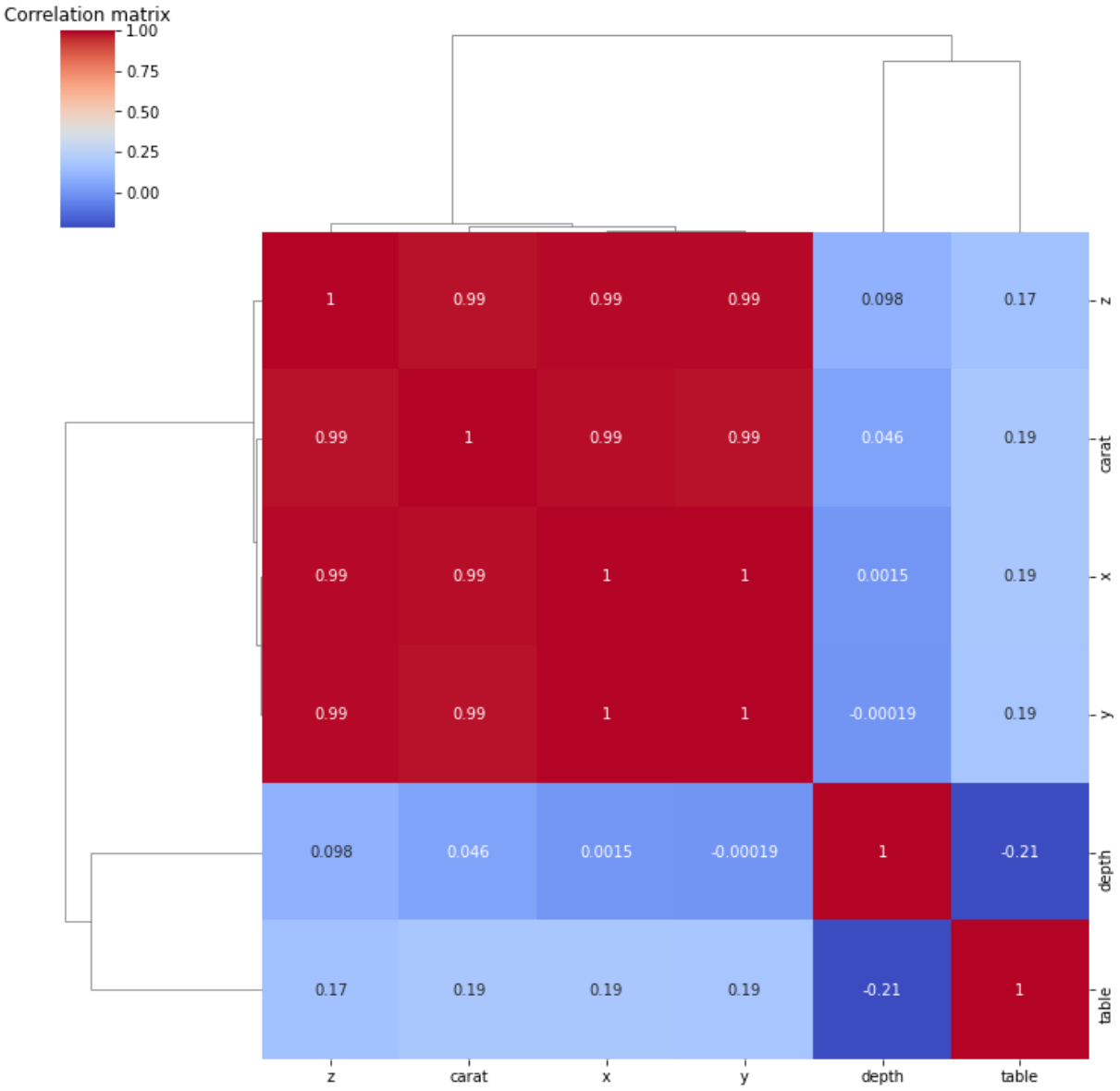
In [19]:
```
#measuring skewness

data[numerical_col].skew()
```

Out[19]:
```
carat    0.710797
depth   -0.190490
table    0.401213
x        0.270281
y        0.263250
z        0.267562
price    1.172117
dtype: float64
```

In [27]:
```
X=data.drop('price',axis=1)
```

In [21]:
```
#multivariate analysis
#CORRELATION MATRIX
#Higher the number more the correlated columns are

corr_matrix = X.corr()
sns.clustermap(corr_matrix,cmap='coolwarm',annot=True)
plt.title("Correlation matrix")
```

Out[21]: Text(0.5, 1.0, 'Correlation matrix')



In [22]:
```
#converting text data to numerical data

le=LabelEncoder()
for ft in category_col:
    data[ft]=le.fit_transform(data[ft])
```

In [23]:
```
data.head()
```

Out[23]:

	carat	cut	color	clarity	depth	table	x	y	z	price
0	0.30	2	1	2	62.1	58.0	4.27	4.29	2.66	499

	carat	cut	color	clarity	depth	table	x	y	z	price
1	0.33	3	3	1	60.8	58.0	4.42	4.46	2.70	984
2	0.90	4	1	7	62.2	60.0	6.04	6.12	3.78	6289
3	0.42	2	2	4	61.6	56.0	4.82	4.80	2.96	1082
4	0.31	2	2	6	60.4	59.0	4.35	4.43	2.65	779

In [29]:
```
#standindizing columns

X=data.drop('price',axis=1)
from sklearn.preprocessing import StandardScaler
scaler = StandardScaler()
X_scaled=scaler.fit_transform(X)
```

In [30]:
```
Y=data['price']
```

In [31]:
```
#Train Test split(30% randomly selected data points as test data)

from sklearn.model_selection import train_test_split
x_train,x_test,y_train,y_test=train_test_split(X_scaled,Y,test_size=0.3,random_state
```

In [32]:
```
#Linear Regression model

from sklearn.linear_model import LinearRegression

model=LinearRegression()
model.fit(x_train,y_train)
y_pred = model.predict(x_test)

#accuracy
model.score(x_test,y_test)
```

Out[32]: 0.8932237791943829