In [1]:

```
import pandas as pd
import numpy as np
import seaborn as sns
from sklearn import preprocessing
```

In [2]:

```
df = pd.read_csv('UpdatedStudentsPerformance.csv')
```

In [3]:

```
df
```

Out[3]:

	gender	race/ethnicity	parental level of education	lunch	test preparation course	math score	reading score	writing score
0	female	group B	bachelor's degree	standard	none	72.0	72.0	74.0
1	female	group C	some college	standard	completed	69.0	90.0	88.0
2	female	group B	master's degree	standard	none	90.0	95.0	93.0
3	male	group A	associate's degree	free/reduced	none	47.0	57.0	44.0
4	male	group C	some college	standard	none	76.0	78.0	75.0
...	...	...	...	...	...	...	...	...
995	female	group E	master's degree	standard	completed	88.0	99.0	95.0
996	male	group C	high school	free/reduced	none	62.0	55.0	55.0
997	female	group C	high school	free/reduced	completed	59.0	71.0	65.0
998	female	group D	some college	standard	completed	68.0	78.0	77.0
999	female	group D	some college	free/reduced	none	77.0	86.0	86.0

1000 rows × 8 columns

In [4]:

```
df.head()
```

Out[4]:

	gender	race/ethnicity	parental level of education	lunch	test preparation course	math score	reading score	writing score
0	female	group B	bachelor's degree	standard	none	72.0	72.0	74.0
1	female	group C	some college	standard	completed	69.0	90.0	88.0
2	female	group B	master's degree	standard	none	90.0	95.0	93.0
3	male	group A	associate's degree	free/reduced	none	47.0	57.0	44.0
4	male	group C	some college	standard	none	76.0	78.0	75.0

In [5]:

```
df.tail()
```

Out[5]:

	gender	race/ethnicity	parental level of education	lunch	test preparation course	math score	reading score	writing score
995	female	group E	master's degree	standard	completed	88.0	99.0	95.0
996	male	group C	high school	free/reduced	none	62.0	55.0	55.0
997	female	group C	high school	free/reduced	completed	59.0	71.0	65.0
998	female	group D	some college	standard	completed	68.0	78.0	77.0
999	female	group D	some college	free/reduced	none	77.0	86.0	86.0

In [7]:

```
df.shape
```

Out[7]:

```
(1000, 8)
```

In [8]:

```
df.dtypes
```

Out[8]:

```
gender                          object
race/ethnicity                  object
parental level of education     object
lunch                           object
test preparation course         object
math score                     float64
reading score                  float64
writing score                  float64
dtype: object
```

In [9]:

```
df.isna().sum()
```

Out[9]:

```
gender                          0
race/ethnicity                  0
parental level of education     0
lunch                           0
test preparation course         0
math score                     10
reading score                  15
writing score                  11
dtype: int64
```

In [40]:

```
df1 = df.fillna(df.mean(numeric_only = True))
```

In [41]:

```
df1.isna().sum()
```

Out[41]:

```
gender                         0
race/ethnicity                 0
parental level of education    0
lunch                          0
test preparation course        0
math score                     0
reading score                  0
writing score                  0
dtype: int64
```

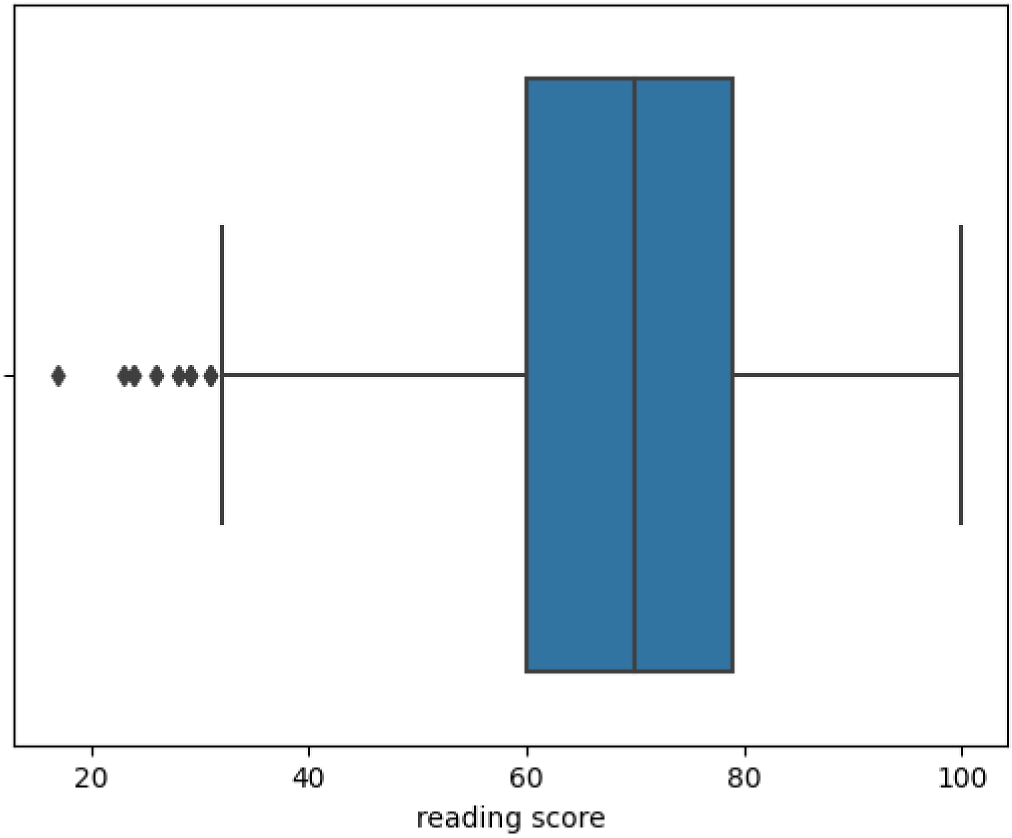
Deal With Outliers

In [15]:

```
sns.boxplot(x='reading score',data = df1)
```

Out[15]:

```
<Axes: xlabel='reading score'>
```

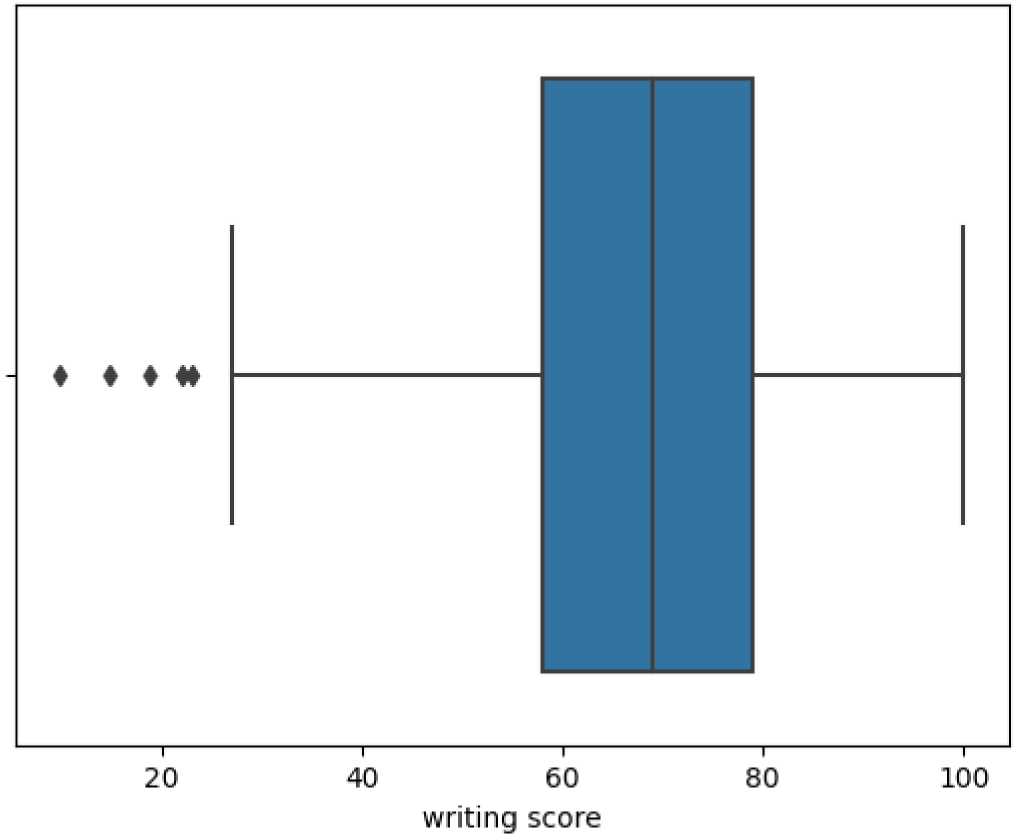


In [16]:

```
sns.boxplot(x='writing score',data = df1)
```

Out[16]:

```
<Axes: xlabel='writing score'>
```

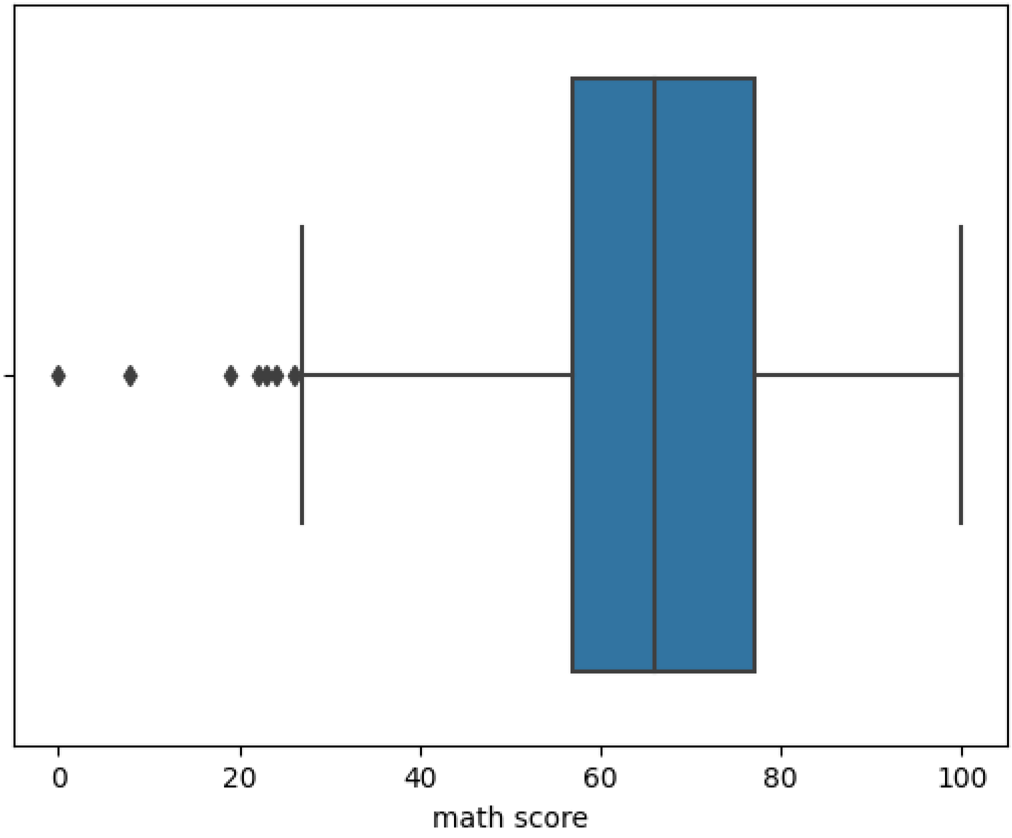


In [17]:

```
sns.boxplot(x='math score',data = df1)
```

Out[17]:

```
<Axes: xlabel='math score'>
```



IQR to deal with outliers

In [43]:

```
df2 = pd.concat([df1['reading score'],df1['writing score'],df1['math score']],axis = 1)
```

In [45]:

```
df2.isna().sum()
```

Out[45]:

```
reading score    0
writing score    0
math score       0
dtype: int64
```

In [50]:

```
Q1 = df2.quantile(0.25)
print("25 percentile\n",Q1)
```

```
25 percentile
 reading score    60.0
writing score    58.0
math score       57.0
Name: 0.25, dtype: float64
```

In [55]:

```
Q3 = df2.quantile(0.75)
print("75 percentile\n",Q3)
```

```
75 percentile
 reading score    79.0
writing score    79.0
math score       77.0
Name: 0.75, dtype: float64
```

In [56]:

```
IQR = Q3 - Q1
print("IQR is = \n",IQR)
```

```
IQR is =
 reading score    19.0
writing score    21.0
math score       20.0
dtype: float64
```

In [57]:

```
low = Q1 - 1.5 * IQR
high = Q3 + 1.5 * IQR
print(low)
print(high)
```

```
reading score    31.5
writing score    26.5
math score       27.0
dtype: float64
reading score    107.5
writing score    110.5
math score       107.0
dtype: float64
```

In [58]:

```
newdf = df2[~(((df2<low)|(df2>high)).any(axis = 1))]
```

In [59]:

```
newdf
```

Out[59]:

	reading score	writing score	math score
0	72.0	74.0	72.0
1	90.0	88.0	69.0
2	95.0	93.0	90.0
3	57.0	44.0	47.0
4	78.0	75.0	76.0
...	...	...	...
995	99.0	95.0	88.0
996	55.0	55.0	62.0
997	71.0	65.0	59.0
998	78.0	77.0	68.0
999	86.0	86.0	77.0

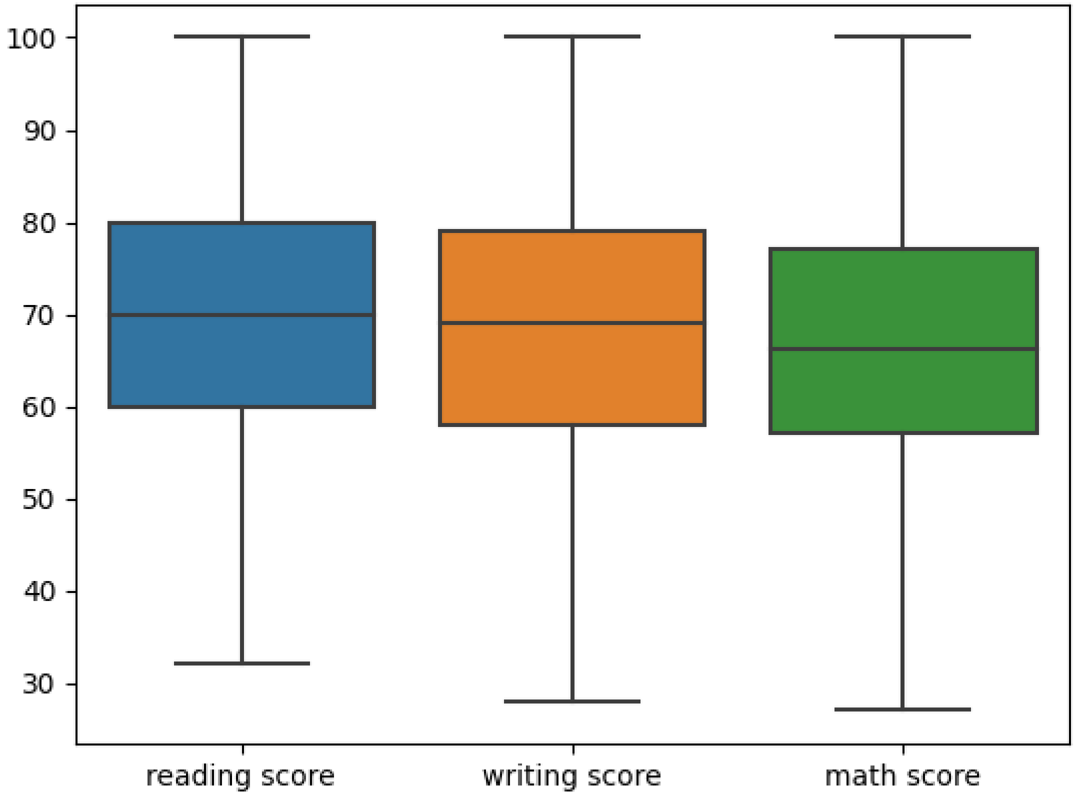
986 rows × 3 columns

In [60]:

```
sns.boxplot(data = newdf)
```

Out[60]:

```
<Axes: >
```



Z score normalization

In [64]:

```
from sklearn.preprocessing import StandardScaler

scaler = StandardScaler()

z_score = scaler.fit_transform(newdf)

z_score = pd.DataFrame(z_score,columns = newdf.columns)
z_score
```

Out[64]:

	reading score	writing score	math score
0	0.157906	0.367221	0.365931
1	1.460757	1.342722	0.155544
2	1.822660	1.691115	1.628255
3	-0.927802	-1.723137	-1.387295
4	0.592190	0.436900	0.646448
...	...	...	...
981	2.112182	1.830472	1.487997
982	-1.072564	-0.956672	-0.335359
983	0.085526	-0.259886	-0.545747
984	0.592190	0.576257	0.085415
985	1.171235	1.203364	0.716577

986 rows × 3 columns

Min Max Normalization

In [65]:

```
from sklearn.preprocessing import MinMaxScaler
scaler = MinMaxScaler()

MinMax = scaler.fit_transform(newdf)

MinMax = pd.DataFrame(MinMax,columns = newdf.columns)

MinMax
```

Out[65]:

	reading score	writing score	math score
0	0.588235	0.638889	0.616438
1	0.852941	0.833333	0.575342
2	0.926471	0.902778	0.863014
3	0.367647	0.222222	0.273973
4	0.676471	0.652778	0.671233
...	...	...	...
981	0.985294	0.930556	0.835616
982	0.338235	0.375000	0.479452
983	0.573529	0.513889	0.438356
984	0.676471	0.680556	0.561644
985	0.794118	0.805556	0.684932

986 rows × 3 columns

In [ ]:

In [ ]:

In [ ]: