AS Assignment 1 - EMPLOYEE ENGAGEMENT - Mateus Veloso

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Question 1 - Obtain Box-Whisker Plot of Employee Engagement Score by Gender and interpret

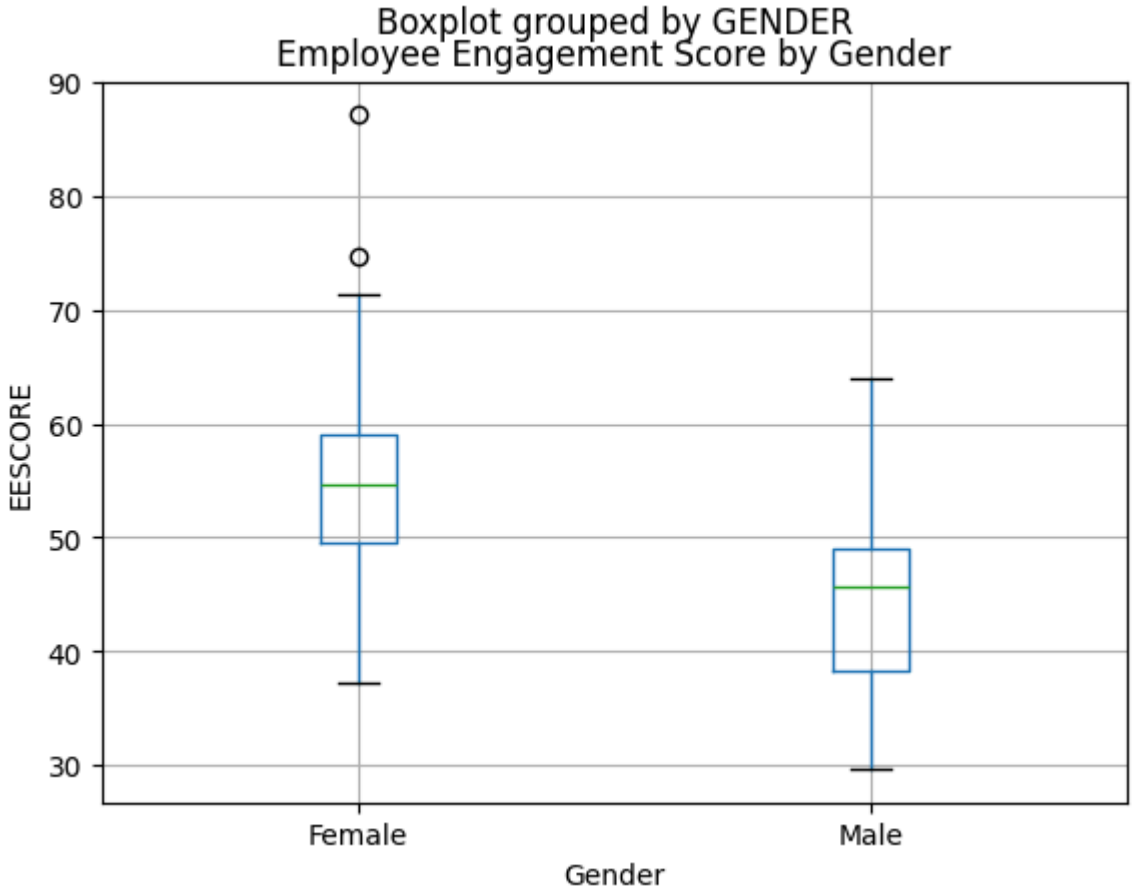
In [27]:
```
import pandas as pd
import matplotlib.pyplot as plt
import numpy as np

%matplotlib inline
```

In [25]:
```
df = pd.read_csv("EMPLOYEE ENGAGEMENT DATA.csv")
df.head(), df.tail()
```

Out[25]:
```
(   EMPNO     DEPT GENDER  EESCORE  FEEDBACK
 0     11       IT   Male    32.13         3
 1    830       IT   Male    54.13         2
 2     65  FINANCE   Male    44.25         4
 3     66    SALES   Male    37.75         3
 4    130       IT   Male    53.50         2,
     EMPNO     DEPT  GENDER  EESCORE  FEEDBACK
 81   1047       IT  Female    49.63         3
 82   1050    SALES  Female    51.75         3
 83   1051       IT  Female    42.25         3
 84   1191    SALES  Female    54.38         2
 85   1193  FINANCE  Female    51.63         3)
```

In [16]:
```
plt.figure(figsize=(6, 4))
df.boxplot(column="EESCORE", by="GENDER")
plt.title("Employee Engagement Score by Gender")
#plt.suptitle("")
plt.xlabel("Gender")
plt.ylabel("EESCORE")
plt.show()
```

```
<Figure size 600x400 with 0 Axes>
```

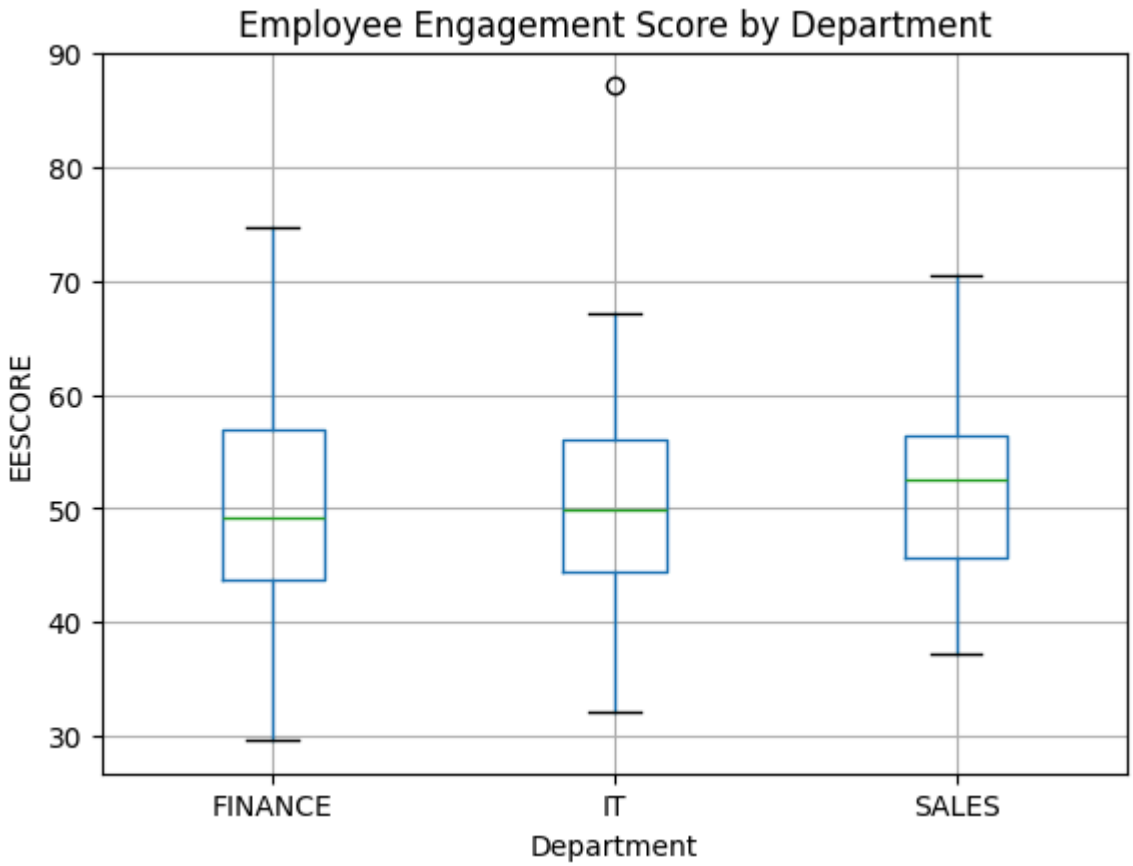


The boxplot shows a clear difference between genders. Female employees present a higher engagement level orerall. Their median score is noticeably higher than that of male employees, and their score distribution is shifted upward. Female employees also reach higher maximum values, indicating that the most engaged individuals tend to be women. Males show lower scores on average and a more compact distribution. Although females display slightly more variability, the overall pattern suggests that female employees are generally more engaged than male employees.

Question 2 - Obtain Box-Whisker Plot of Employee Engagement Score by Department and interpret

In [40]:
```
plt.figure(figsize=(8, 5))
df.boxplot(column="EESCORE", by="DEPT")
plt.title("Employee Engagement Score by Department")
plt.suptitle("")
plt.xlabel("Department")
plt.ylabel("EESCORE")
plt.show()
```

```
<Figure size 800x500 with 0 Axes>
```



The boxplot shows clear differencews in engagementr across departments. Sales has the highest engagement, with both its median and mean positioned above those of the other
groups. It also displays the most compact distribution, suggesting more consistent angagement among employees in this area. IT presents a slightly lower median but shows
some extremely high scores, which increases its upper range. Finance has the lowest engagement overall and the largest variability. indicated by a wider spread of values and lower minimum scores. Overall, Sales appears to be the most engaged department, Finance the least engaged, and IT sits in the middle with a wider range of engagement level.

Question 3 - Summarize Employee Engagement Score by Combinations of Gender and Department using n, mean, standard deviation and coefficient of variation.

In [43]:
```
group_gd = df.groupby(["GENDER", "DEPT"])["EESCORE"]

summary_gd = group_gd.agg(
    n = "count",
    mean = "mean",
    sd = "std"
)

summary_gd["cv"] = summary_gd["sd"] / summary_gd["mean"]

summary_gd
```

Out[43]:

GENDER	DEPT	n	mean	sd	cv
Female	**FINANCE**	17	56.525294	8.426836	0.149081
	IT	18	53.426667	11.126338	0.208254
	SALES	20	55.303000	8.847113	0.159975
Male	**FINANCE**	11	40.139091	5.911143	0.147266
	IT	14	48.128571	8.587525	0.178429
	SALES	6	45.606667	5.198652	0.113989

The results show that female employees have higher engagement scores than male employees across all departments. The highest engagement is found among females in IT, while males in IT show the lowest scores. Sales is the most consistent department, with lower variations in results. In contrast, males in Finance and IT present the most variability. Overall, engagement differs across gender-department groups, with female employees showing stronger and more stable scores.

Question 4 - Can you infer that the average EES is same for all department?

In [44]:
```
dept_mean = df.groupby("DEPT")["EESCORE"].agg(["count", "mean", "std"])
dept_mean
```

Out[44]:

DEPT	count	mean	std
FINANCE	28	50.087857	11.019929
IT	32	51.108750	10.292910
SALES	26	53.065385	9.069112

In [45]:
```
from scipy import stats

groups = [g["EESCORE"].values for _, g in df.groupby("DEPT")]

f_stat, p_value = stats.f_oneway(*groups)
f_stat, p_value
```

Out[45]:
```
(np.float64(0.5919511725108152), np.float64(0.5555652959459478))
```

No. The departments show clear differences in their engagement levels. Sales has the highest mean engagement score, IT sits in the middle, and Finance has the lowest. These noticeable differences indicates that the average engagement is not the same across departments.

Question 5 - Summarize “Feedback” by Gender using count and percentage.

In [46]:
```
feedback_counts = pd.crosstab(df["GENDER"], df["FEEDBACK"])
feedback_counts
```

Out[46]:

GENDER	1	2	3	4
Female	2	13	25	15
Male	1	8	12	10

In [49]:
```
feedback_percent = pd.crosstab(df["GENDER"], df["FEEDBACK"], normalize="index")
feedback_percent = feedback_percent.round(2)
feedback_percent
```

Out[49]:

GENDER	1	2	3	4
Female	3.64	23.64	45.45	27.27
Male	3.23	25.81	38.71	32.26

The distribution of feedback scores is similar for both genders.
Most responses fall in the middle categories with only small differences between male and female employees. Overall, no gender shows a strong tendency toward a particular feedback level, and the pattrern is broadly consistent across groups.

Question 6 - Summarize EES for each level of feedback using n and mean.

In [ ]:
```
```

In [51]:
```
summary_feedback = df.groupby("FEEDBACK")["EESCORE"].agg(
    n="count",
    mean="mean"
).round(2)

summary_feedback
```

Out[51]:

FEEDBACK	n	mean
1	3	51.67
2	21	51.41
3	37	51.20
4	25	51.54

When summarising the engagement score for each feedback level, the results show that the mean EES remais almost the same across all categories. Feedback levels 1, 2, 3 and 4 have very similar average engagement scores, ranging only

between 51.20 and 51.67. This also reflects in the group sizes, which vary but do not show large differences in engagement. Overall, the data does not include a strong relationship between feedback level and engagement, as employees across all feedback levels show nearly identical EES values.