DL1_C5_S7_Challenge

Task 1: Aerospace company

In [1]:
```
from scipy.stats import t,f,f_oneway
import numpy as np
import matplotlib.pyplot as plt
```

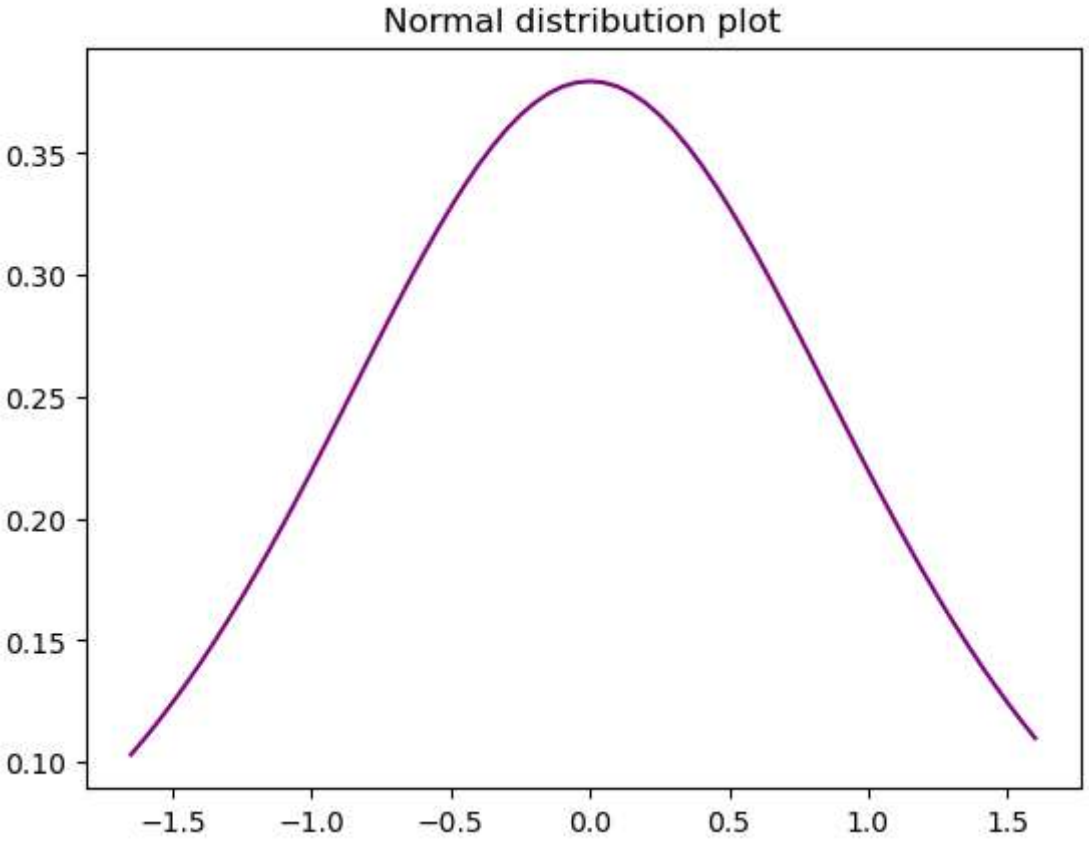
In [10]:
```
aero=[15,16,16,0,7,20,6,8,17,25,8,21,29,11,9,21,3,12]
n=len(aero)
mean_p=np.mean(aero)
alpha=0.1
dof=18-1
s_samp=np.std(aero)

t_crit=t.ppf(alpha/2,dof)
print("t_critical = ", t_crit)
```

```
t_critical =  -1.7396067260750676
```

In [23]:
```
lhs = mean_p-1.65*(s_samp/(n)**0.5)
rhs = mean_p+1.65*(s_samp/(n)**0.5)
print("confidance level lhs = ",lhs )
print("confidance level rhs = ",rhs )
```

```
confidance level lhs =  10.758595400116956
confidance level rhs =  16.352515710994155
```

In [22]:
```
nr=np.arange(-1.65,1.65,.05)
plt.plot(nr,t.pdf(nr,5),color="purple")
plt.title("Normal distribution plot")
plt.show()
```



In [ ]:
```
Conclusion:
The population means are lies between 10.75<= u >=16.35
```

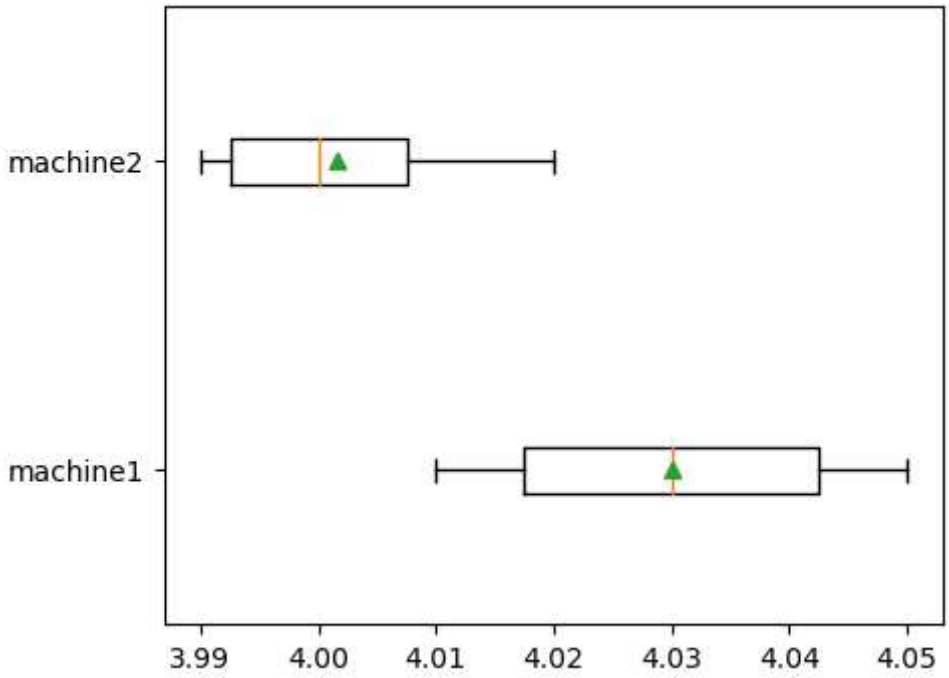
Task 2

In [ ]:
```
H0 :avg fill of machine is not same
H1 :avg fill of machine is same
so two tail test
```

In [16]:
```
M1=[4.05,4.01,4.04,4.02]
M2=[4.02,3.99,4.01,3.99,4.00,4.00]

x1=np.mean(M1)
x2=np.mean(M2)

n1=len(M1)
n2=len(M2)

v1=(np.std(M1))**2
v2=(np.std(M2))**2

alpha=0.1
dof=(n1+n2)-2

# T_critical
t_crit=t.ppf(1-alpha/2,dof)
print("The test critical value is = ",t_crit)

# T_statistics
numerator = abs(x1-x2)
denominator = (v1*(n1-1)**0.5 + v2*(n2-1))*(1/n1 +1/n2)**0.5
t_stats=numerator/denominator
print("The test statistics values is = ",t_stats)

# P_Value
p_val= t.sf(abs(t_stats), dof)*2
print("The p value for this samples ", p_val)
```

```
The test critical value is =  1.8595480375228424
The test statistics values is =  43.78622210178448
The p value for this samples  8.165969367082735e-11
```

In [18]:
```
fig = plt.figure(figsize =(5,4))
ma=[M1,M2]
plt.boxplot(ma,showmeans=True, vert=0)
plt.yticks([1,2],["machine1","machine2"])
plt.show()
```




```
Conclusion :

i. If p-value < α : Rejection of Null Hypothesis(H0)
ii. If -t-critical > t-statistic > +t-critical : Rejection of Null
Hypothesis(H0)
```

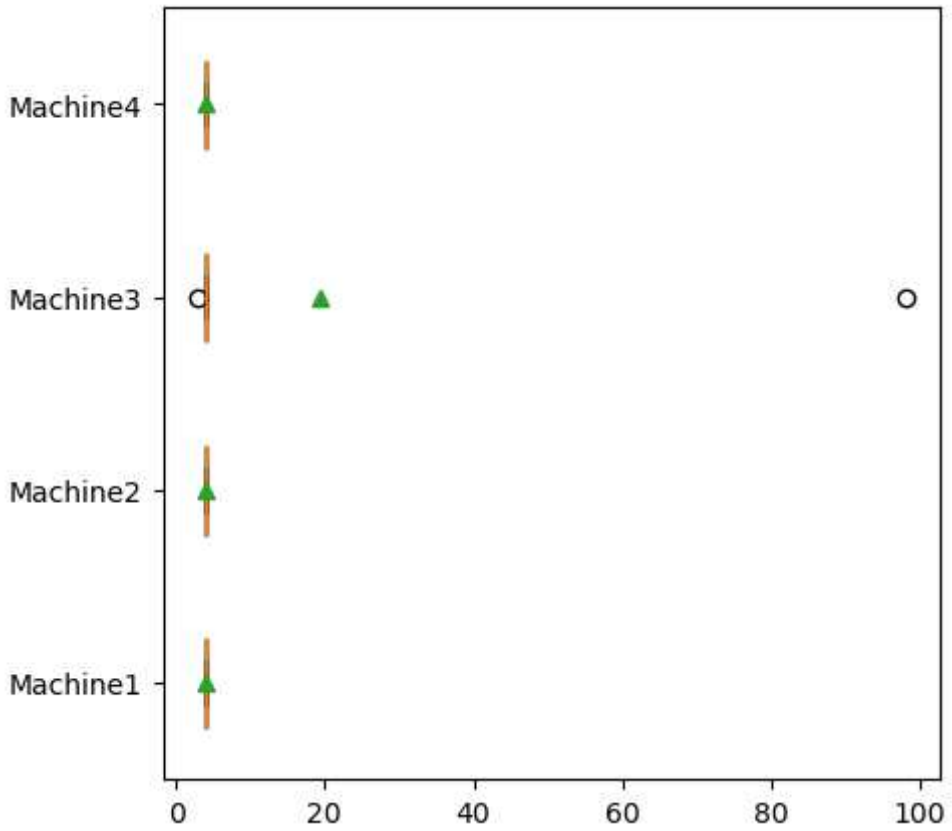
```
p_value=8.16e-11 < alpha=0.01 :Rejection of null hypothesis.
t_statistics=43.78 >t_critical=1.85 :Rejection of null hypothesis.
```

Task 3:

In [ ]:
```
H0 :avg fill of machine is not same
H1 :avg fill of machine is same
so two tail test
```

In [21]:
```
M1=[4.05,4.01,4.04,4.02]
M2=[4.02,3.99,4.01,3.99,4.00,4.00]
M3=[4.00,3.97,3.95,3,98,3.97]
M4=[4.01,4.00,3.99,4.02]


n1=len(M1)
n2=len(M2)
n3=len(M3)
n4=len(M4)
n=n1+n2+n3+n4
dfc=4-1
dfe=20-4


f_critical =f.ppf(1-0.01,dfc,dfe)
print('f_critical =',f_critical)


f_statistics,p_value=f_oneway(M1,M2,M3,M4)
print('f_statistics = ',f_statistics)


print('P_value = ',p_value)
fig=plt.figure(figsize=(5,5))
data=[M1,M2,M3,M4]
plt.boxplot(data,vert=0,showmeans=True)
plt.yticks([1,2,3,4],['Machine1','Machine2','Machine3','Machine4'])
plt.show()
```

```
f_critical = 5.2922140455209465
f_statistics =  0.7246278502878643
P_value =  0.5519601735201322
```



In [ ]:
```
conclusion:
```

In [ ]:
```
i. If p_value < alpha : Rejection of Null Hypothesis (H0)

ii. If F-statistic > F-critical : Rejection of Null Hypothesis(H0)


p_value = 0.55196017 > alpha = 0.01 : Accept of null hypothesis.
f_statistics=0.7246278 < f_critical=5.292214 :Accept of null hypothesis.
```