

```
In [23]: import numpy as np
import pandas as pd
from scipy.stats import norm,t, ttest_1samp
import matplotlib.pyplot as plt
```

Example 1

A french cake shop claims that the average number of pastries they can produce in a day exceeds 500. The average number of pastries produced per day over a 70 day period was found to be 530. Assume that the population standard deviation for the pastries produced per day is 125. Test the claim using a z-test with the critical z-value = 1.64 at the alpha (significance level) = 0.05, and state your interpretation.

```
In [2]: # Ho : mu = 500
# Ha : mu > 500

z_stat = (530-500)/(125/np.sqrt(70))
print("z_stat : ", z_stat)
alpha = 0.05
print("alpha : ", alpha)
p_value = 1-norm.cdf(z_stat)
print("p_value : ", p_value)
if p_value < alpha :
    print("Reject Ho")
else:
    print("Failed to Reject Ho")

z_stat :  2.007984063681781
alpha :  0.05
p_value :  0.022322492581293485
Reject Ho
```

```
In [3]: z_critical_value=norm.ppf(0.95)
print("z_critical_value : ",z_critical_value)

z_critical_value :  1.6448536269514722
```

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In [4]: critical_value = 500 + (z_critical_value*(125/np.sqrt(70)))
print("critical_value : ",critical_value)

critical_value :  524.574701413748
```

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In [5]: norm.ppf(q=0.95,loc=500,scale=(125/np.sqrt(70)))
```

```
Out[5]: 524.574701413748
```

```
In [6]: observed_value= 530
if critical_value < observed_value:
    print("Interpretation : Reject Ho")
else:
    print("Interpretation : Fail to Reject Ho")

Interpretation : Reject Ho
```

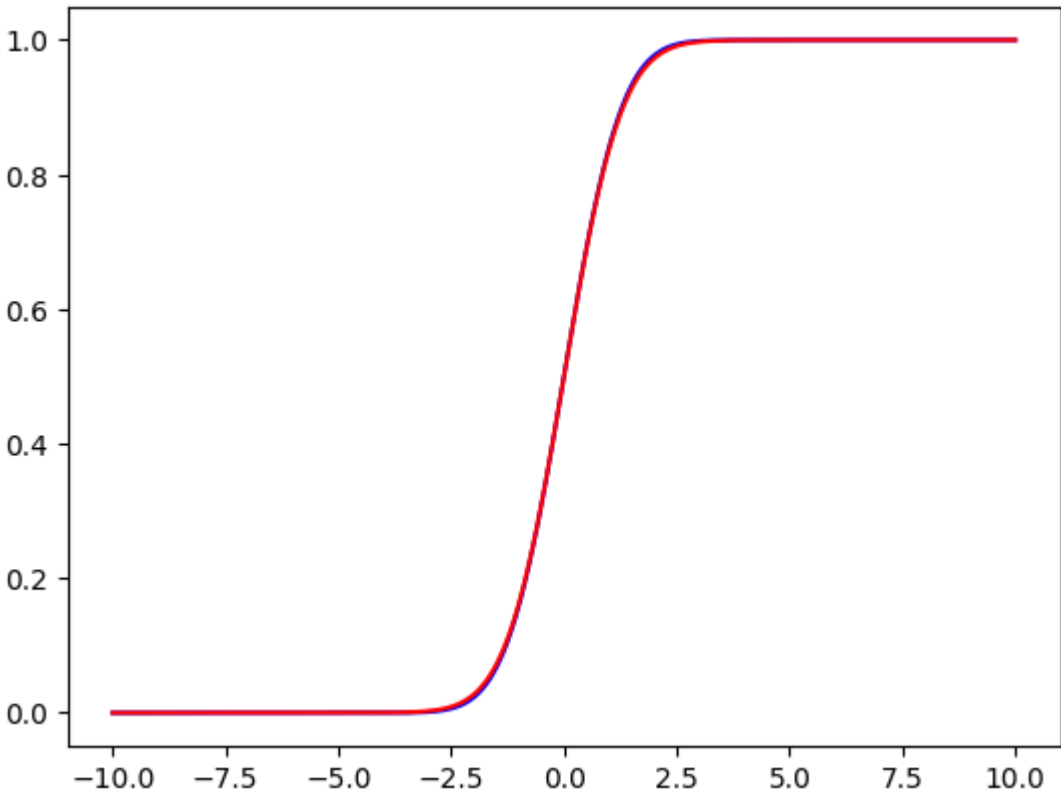
```
In [ ]:
```

T Distribution

```
In [18]: x_val = np.linspace(-10,10,1000)
y_val = norm.cdf(x_val)
plt.plot(x_val,y_val,color="Blue")

y_val_t = t.cdf(x_val,df=30)
plt.plot(x_val,y_val_t,color="Red")
```

```
Out[18]: [<matplotlib.lines.Line2D at 0x78b8591903a0>]
```



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In [ ]:
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In [ ]:
```

Pill Question

```
In [ ]: # population Mean = 100
# One researcher claims that the pill will help in increasing the iq
```

```
In [22]: # Ho : mu = 100 ( pill had no effect)
# Ha : mu > 100 ( pill had effect)
```

```
In [20]: iq_scores = [110, 105, 98, 102, 99, 104, 115, 95]
```

```
In [31]: np.std(iq_scores,ddof=1)
```

```
Out[31]: 6.568322247184371
```

```
In [32]: pd.Series(iq_scores).std()
```

```
Out[32]: 6.568322247184371
```

```
In [21]: np.mean(iq_scores)
```

```
Out[21]: 103.5
```

```
In [ ]: # Establish at 99% confidence ( 0.01 significance level)
```

```
In [25]: ttest_1samp(iq_scores,100,alternative="greater")
```

```
Out[25]: TtestResult(statistic=1.5071573172061195, pvalue=0.08774972467925055, df=7)
```

```
In [26]: # # fail to reject the Ho
```

```
In [28]: t_stat=(103.5-100)/(pd.Series(iq_scores).std()/np.sqrt(8))
t_stat
```

```
Out[28]: 1.5071573172061195
```

```
In [29]: 1-t.cdf(t_stat,df=7)
```

```
Out[29]: 0.08774972467925057
```

