Fair or unfair coin?

```
import numpy as np
import matplotlib.pyplot as plt
from scipy import stats
import seaborn as sns
```

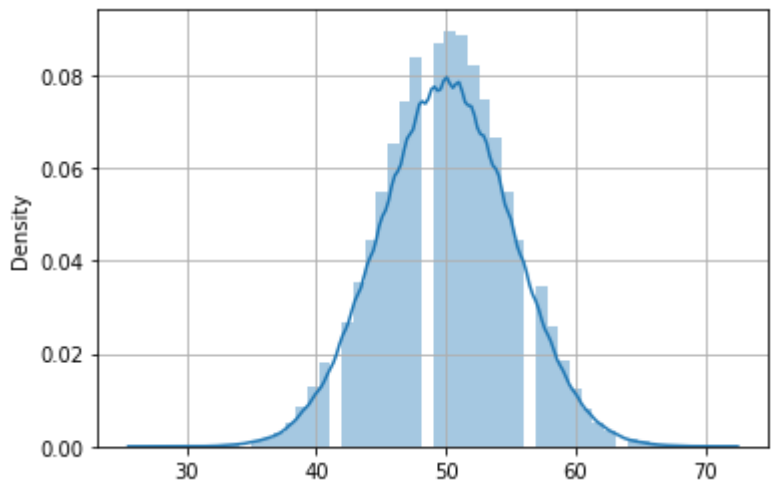
```
# Expt: Toss the coin 100 times
# Test statistic: Count the number of heads
# H0: Coin is fair
# Ha: Coin is unfair
# T ~ Binomial(n=100, p=0.5) under Null Hypothesis(=H0)

prob = stats.binom.cdf(k=25, n=100, p=0.5) + (1 - stats.binom.cdf(k=75, n=100, p=0.
print(prob) # P( T<=30 or T>=70  | H0 )
```

```
3.723142327660961e-07
```

```
# Plot PDF of Binomial(100, 0.5)
X = stats.binom.rvs(n=100, p=0.5, size=100000)
plt.grid()
sns.distplot(X)
```

```
/usr/local/lib/python3.7/dist-packages/seaborn/distributions.py:2619: FutureWa
  warnings.warn(msg, FutureWarning)
<matplotlib.axes._subplots.AxesSubplot at 0x7fd257cb9110>
```



Double-click (or enter) to edit

```
## 2-sided  and 1 sided test
```

```
k=64 #39 #59
print(1-stats.binom.cdf(k, n=100, p=0.5))
```

```
0.0017588208614850442
```