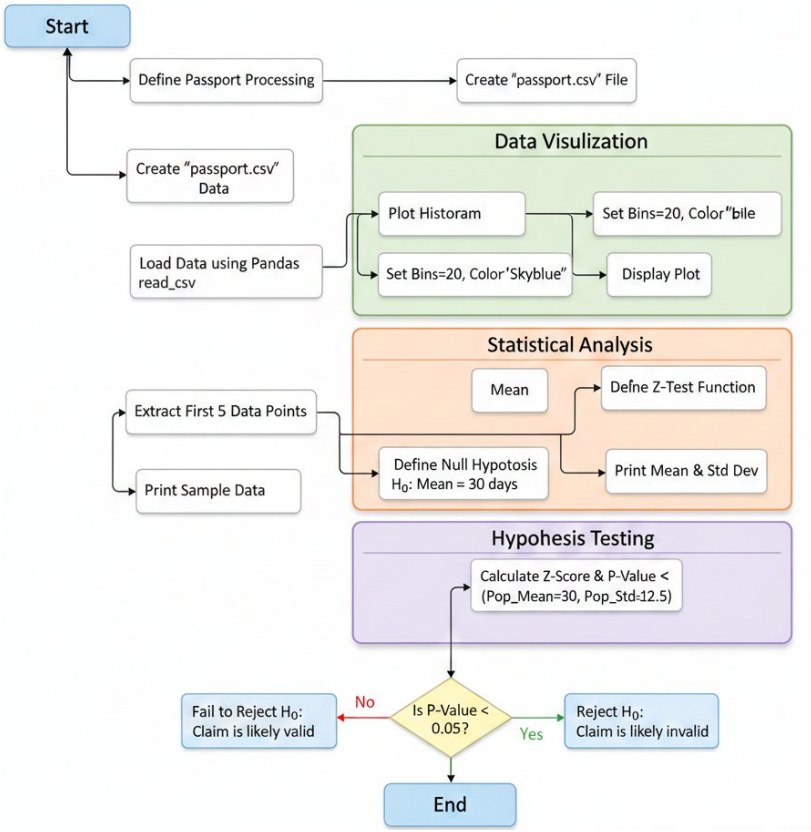
Experiment No - 2

Date of experiment: 02/02/2026

Date of Completion: 02/02/2026

Flow Chart:



Source Code:

```
from matplotlib import pyplot as plt
import pandas as pd

passport_df = pd.read_csv("Passport.csv", header=None) # There is no

passport_data = passport_df.iloc[0].values

plt.hist(passport_data, bins=20, color='skyblue', edgecolor='black')
plt.title('Histogram of Passport Processing Times')
plt.xlabel('Processing Time (days)')
plt.ylabel('Frequency')
plt.show()
```

```
passport_df = pd.read_csv("Passport.csv", header=None)
passport_data = passport_df.iloc[0].values

print(passport_data[:5])
```

```
[16. 16. 30. 37. 25.]
```

```
mean_of_samples = passport_data.mean()
std_of_samples = passport_data.std()

print(f"The mean of the data is: {mean_of_samples}")
print(f"The standard deviation of the data is: {std_of_samples}")
```

```
The mean of the data is: 27.05
The standard deviation of the data is: 6.1682655584856265
```

```
import math
from scipy import stats # Import the stats module
def z_test(pop_mean, pop_std, sample):
  z_score = (sample.mean() - pop_mean)/(pop_std/math.sqrt(len(sample)))
  return z_score, stats.norm.cdf(z_score)
z_test(30, 12.5, passport_df['Processing time']) # Corrected column name
```

```
(np.float64(-1.4925950555994747), np.float64(0.06777160919961511))
```

Dataset:

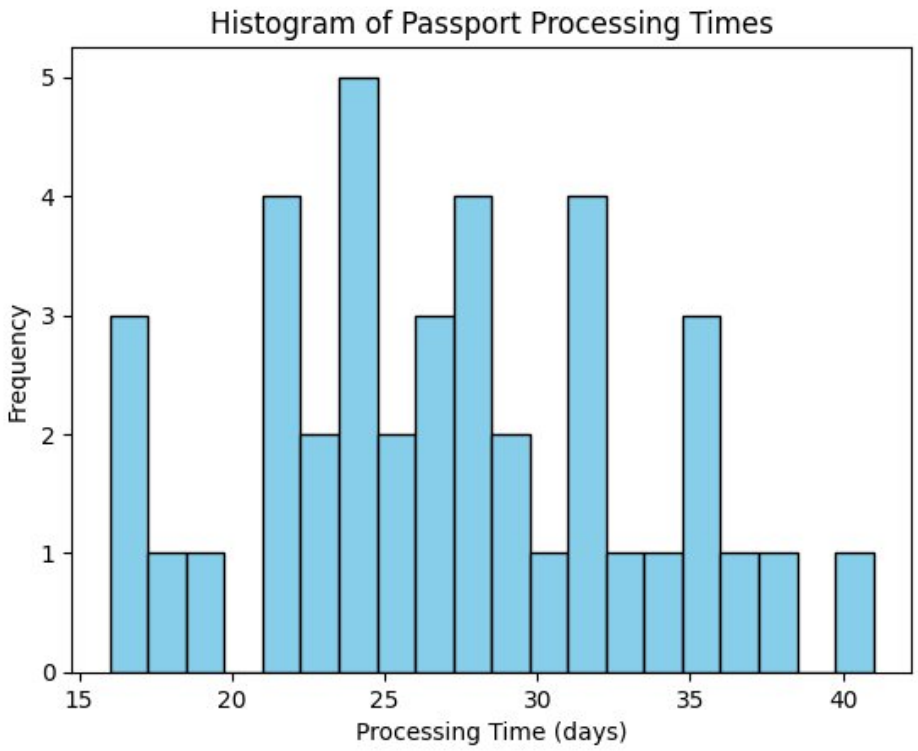
The analysis uses a custom-generated dataset of passport issuance records, specifically focusing on the efficiency of administrative processing.

- Data Source: The information is stored in a file titled passport.csv.
- Sample Size: The dataset contains processing time data for 40 individual cases.
- Observation Period: The data tracks the number of days elapsed from application submission to issuance.

The dataset includes the following variables:

- Processing Time: The primary numerical variable representing the duration in days (e.g., 16.0, 30.0, 37.0).
- Frequency: The count of occurrences for each time interval, utilized for generating the histogram.

Result:



Conclusion:

The objective of this experiment was to verify the passport office's claim that applications are processed within **30 days** using a Z-test at a significance level (α) of **0.05**.

- **Statistical Evidence:** The Z-test yielded a **P-value of 0.0678**.
- **Decision Rule:** Since the P-value (0.0678) is **greater** than the significance level (0.05), we **fail to reject the null hypothesis (H_0)**.
- **Final Inference:** There is no statistically significant evidence to disprove the claim. Therefore, we conclude that the passport office's claim of a 30-day processing time is likely valid based on the provided sample data.