1. We have a few ways to control bias
    a. Corroborating findings with external or independent datasets to minimize the effect of biases in the original dataset
    b. Increase the number of samples
    c. Using statistical techniques such as regression analysis to adjust for the influence of confounding variables
2. A confounder is a variable that influences both the dependent variable and independent variable, leading to a spurious association. It can cause a researcher to incorrectly believe that there is a cause-and-effect relationship between the independent and dependent variables.
3. A/B testing is a method to compare two versions of a single variable to determine which version performs better. It involves a controlled experiment with two groups: A (control group) and B (treatment group), to measure the effect of a change or difference between the groups.
4. The Welch t-test is used when comparing the means of two groups that may have different variances and possibly different sample sizes.
5. Null Hypothesis: H_0:mu=6 H_A: mu>6
    a. $$t = \frac{\bar{x} - \mu}{s/\sqrt{n}}$$ we can use t-test to find the t-statistic

b. .

```
from scipy import stats
import numpy as np

# Customer service call time hypothesis test
# Population mean (under H0), sample mean, sample standard deviation, sample size
mu_0 = 6
x_bar = 6.5
s = 1.2
n = 50

# Calculate the t-statistic and p-value for one-sample t-test
t_statistic = (x_bar - mu_0) / (s / np.sqrt(n))
p_value = stats.t.sf(t_statistic, df=n-1)  # one-tailed test

(t_statistic, p_value)
```

```
(2.946278254943948, 0.0024555744280253798)
```

```
# Testing differences in mean scores between groups for math test
# Group A details
mu_a = 75
std_a = 8
n_a = 25

# Group B details
mu_b = 78
std_b = 7
n_b = 30

# Calculate the test statistic and p-value for Welch's t-test
t_statistic_groups, p_value_groups = stats.ttest_ind_from_stats(mean1=mu_a, std1=std_a, nobs1=n_a,
                                                                mean2=mu_b, std2=std_b, nobs2=n_b,
                                                                equal_var=False)  # Welch's t-test

(t_statistic_groups, p_value_groups)
```

```
(-1.4650132801342768, 0.14941450596390296)
```

c. For question 5 As we can see $p<0.05$, reject the null hypothesis
d. For question 6, as we can see $p>0.05$, fail to reject the null hypothesis