

a)

1. **Define the Parameters:**

- Let  $p$  be the true proportion of voters in favor of Springfest.

2. **State the Hypotheses:**

- Null hypothesis ( $H_0$ ):  $p = 0.60$
- Alternative hypothesis ( $H_1$ ):  $p > 0.60$

3. **Conduct the Hypothesis Test Using R:**

**Code:**

```
# Number of surveyed voters and number in favor
n_springfest <- 116
x_springfest <- 78

# Proportion of voters in favor
p_hat_springfest <- x_springfest / n_springfest

# Hypothesis test
prop_test_springfest <- prop.test(x_springfest, n_springfest, p = 0.60,
alternative = "greater", correct = FALSE)
prop_test_springfest
```

**Output:**

```
1-sample proportions test without continuity correction

data:  x_springfest out of n_springfest, null probability 0.6
X-squared = 2.5345, df = 1, p-value = 0.05569
alternative hypothesis: true p is greater than 0.6
95 percent confidence interval:
 0.5975199 1.0000000
sample estimates:
      p
0.6724138
```

b)

- **Test Statistic:**  $X^2 = 2.5345$
- **P-value:** 0.05569

Using the significance level  $\alpha=0.05$ , we do not reject the null hypothesis because the p-value (0.05569) is greater than 0.05.

c)

**Conclusion:** Based on the hypothesis test, there is not enough evidence to suggest that the proportion of voters in favor of Springfest exceeds 60%. Therefore, it is not reasonable to conclude that the proportion of voters in favor of Springfest exceeds 60%.

d)

### Code:

```
# Number of surveyed voters and number in favor
n_autumnfest <- 182
x_autumnfest <- 110

# Proportion of voters in favor
p_hat_autumnfest <- x_autumnfest / n_autumnfest

# Confidence interval
ci_autumnfest <- prop.test(x_autumnfest, n_autumnfest, conf.level = 0.90,
correct = FALSE)
ci_autumnfest
```

### Output:

```
1-sample proportions test without continuity correction

data:  x_autumnfest out of n_autumnfest, null probability 0.5
X-squared = 7.9341, df = 1, p-value = 0.004851
alternative hypothesis: true p is not equal to 0.5
90 percent confidence interval:
 0.5436662 0.6620667
sample estimates:
      p
0.6043956
```

The 90% confidence interval for the true proportion of municipal voters in favor of Autumnfest is (0.5436662, 0.6620667).

e)

**Conclusion:** Based on the confidence interval (0.5436662, 0.6620667), it is not reasonable to assume that only 50% of voters are in favor of Autumnfest. The interval suggests that the

true proportion is likely higher than 50%.