

PreWK3

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Note: Please turn in both RMD file and pdf file to Canvas

PreWork 3

##Pratice 1

Natural cork in wine bottles is subject to deterioration, and as a result wine in such bottles may experience contamination. The article “Effects of Bottle Closure Type on Consumer Perceptions of Wine Quality” (Amer. J. of Enology and Viticulture, 2007: 182–191) reported that, in a tasting of commercial chardonnays, 16 of 91 bottles were considered spoiled to some extent by cork-associated characteristics.

TASK: Does this data provide strong evidence for concluding that more than 15% of all such bottles are contaminated in this way? Let’s carry out a test of hypotheses using a significance level of .10.

DATA:

```
n <- 91
n_spoiled <- 16
p_0 <- 0.15
q_0 <- 1 - p_0
```

##According the HT procedure to design a hypothesis test for p (complete 7 steps below)

1. p = the true proportion of all commercial chardonnay bottles considered spoiled to some extent by cork-associated characteristics.
2. The null hypothesis is ?

Answer: $H_0 : p = 0.15$

3. The alternative hypothesis is ? **Answer:** $H_a : p > 0.15$

4. Since $np_0 = 91(.15) > 10$ and $nq_0 = 91(.85) = 77.35 > 10$, the large-sample z test can be used. The test statistic value is

```
# type the code here
# Given data
n <- 91
n_spoiled <- 16
p_0 <- 0.15
q_0 <- 1 - p_0

# Compute sample proportion
p_hat <- n_spoiled / n

# Compute standard error
SE <- sqrt(p_0 * q_0 / n)
```

```
# Compute z-score
z <- (p_hat - p_0) / SE
z
```

```
## [1] 0.6899094
```

5. The form of H_a implies that an upper-tailed test is appropriate:

rejection region is?

```
# type the code here
# Significance level
alpha <- 0.10

# Compute critical value
z_critical <- qnorm(1 - alpha)

# Display rejection region
z_critical
```

```
## [1] 1.281552
```

6. then z test statistic value is ?

```
# type the code here
# Given data
n <- 91
n_spoiled <- 16
p_0 <- 0.15
q_0 <- 1 - p_0

# Compute sample proportion
p_hat <- n_spoiled / n

# Compute standard error
SE <- sqrt(p_0 * q_0 / n)

# Compute z-score (test statistic)
z <- (p_hat - p_0) / SE
z
```

```
## [1] 0.6899094
```

7. decision:

Answer: If $z > 1.28$, we reject H_0 . If $z \leq 1.28$, we fail to reject H_0

The computed value of z is 0.6899094. Hence, the decision is “we fail to reject H_0 . Or in other words, we cannot accept the claim that more than 15% of the commercial chardonnay bottles are contaminated in this way at 10% significance level.”