Problem 1

Answer: Sample size should be at least 30 and the population distribution should not be extremely skewed.

Problem 2

Answer: False

Problem 3

Answer: $H_0 : p = 0.5$; $H_A : p > 0.5$

Problem 4

Answer:
▷ Version 1: If in fact 10% of the birds in the aviary are cardinals, the probability of obtaining a random sample of 250 birds where exactly 14% are cardinals is 0.0175.
▷ Version 2: If in fact 50% of likely voters support this candidate, the probability of obtaining a random sample of 500 likely voters where 52% or more support the candidate is 0.19.

Problem 5

Answer: 0.022

```
y1 <- 493
n1 <- 1037

y2 <- 596
n2 <- 1028

p_hat <- (y1 + y2) / (n1 + n2)
std_err <- sqrt(p_hat * (1 - p_hat) * (1 / n1 + 1 / n2))
signif(std_err, digits = 3)
```

```
[1] 0.022
```

Problem 6

Answer: Because in hypothesis testing, we assume the null hypothesis is true, hence we calculate SE using the null value of the parameter. In confidence intervals, there is no null value, hence we use the sample proportion(s).

Problem 7

Answer:
▷ Version 1: χ^2 test of goodness of fit
▷ Version 2: Chi-square test of independence [This version has a table.]

Problem 8

Answer:
- ▷ Version 1: Roll a 10-sided die 100 times and record the proportion of times you get a 6 or lower. Repeat this many times, and calculate the number of simulations where the sample proportion is 56% or less.
- ▷ Version 2: Roll a 10-sided die 40 times and record the proportion of times you get a 1. Repeat this many times, and calculate the proportion of simulations where the sample proportion is 15% or more.

Problem 9

Answer: True

Problem 10

Answer:
- ▷ Version 1: False
- ▷ Version 2: Right-skewed

Problem 11

Answer: 3.36

```
col1 <- c(6, 16, 4)
col2 <- c(6, 15, 3)
tbl <- array(c(col1, col2), dim = c(3, 2))

table_total <- sum(tbl)
row_total <- apply(tbl, c(1), sum)[3]
column_total <- apply(tbl, c(2), sum)[2]

exp_male <- row_total * column_total / table_total
signif(exp_male, digits = 3)
```

```
[1] 3.36
```

Problem 12

Answer: True