Elementary Statistics: Solution to Homework 1

Solution

Problem 1.6:

a) Type I error is more serious.

Type I error: In fact the electricity is turned on but you think it is not.

b) Type I error is more serious.

Type I error: In fact the brakes are not operational but you think they are.

c) Type I error is more serious.

Type I error: In fact the snake is poisonous but you think it is not.

d) Type II error is more serious.

Type II error: In fact it is not safe to cross the street but you think it is.

Problem 1.8:

H_0: A person is not a drug user.
H_1: A person is a drug user.

a) Type I error: In fact the person is not a drug user but the test said he/she is.
Type II error: In fact the person is a drug user but the test said he/she is not.

b) 4% or $\frac{4}{100}$.

Problem 1.12:

a) H_0 : The new drug, Septaphine, is not better for reducing the blood pressure compared to Cephaline.
H_1 : The new drug, Septaphine, is better for reducing the blood pressure compared to Cephaline.

b)i) H_1 is supported.
ii) The mistake which is type I Error could have been made. The new drug, Septaphine, could be just as good as or worse than Cephaline.

Problem 1.14: The answer is e).

Problem 1.20: The answer is b).

Problem 1.30:

a) One-sided to the left (the rejection region is on the left hand side of the frequency plot of Machine A).

b) $\alpha = \frac{3}{15}, \quad \beta = \frac{6}{15}$.

c) The p-value is $\frac{10}{15}$.

d) The data is not statistically significant since the p-value is greater than α.

Problem 1.36

a) H_0 : The shown bag is Bag A.

$\quad$ H_1 : The shown bag is Bag B.

b) One-sided to the right.

c) The p-value $= \frac{3}{50} = 0.06$. (We assume the bag is Bag A. Then we calculate the chance with the token with value $14 or more.)

d) Yes, since the p-value is smaller than α.

e) No, since the p-value is greater than α.