(1) (a)
drug <- read.csv(file = "drug.csv", stringsAsFactors = FALSE)
(1) (b)
head(drug)
(1) (c)
names(drug)

(2)
The purpose of the study is to analyze the half-life of aminoglycosides in trauma patients, which is affected by the drug type, dosage, and patient weight. This is part of a study by pharmacy researchers to understand drug behavior in a critical care setting.

Variables in the dataset
1. patient: unique identifier for each patient
2. drug: type of drug administered to the patient
3. half.life: half-life of the drug in the patient's body
4. dosage: dosage of the drug administered to the patient
sample size: 43
n <- length(drug$patient)

(3)
patient: qualitative and nominal data
drug: qualitative and nominal data
half.life: quantitative and continuous data
dosage: quantitative and continuous data

(4)
Frequency table for type of drugs

Drug	Frequency	Relative Frequency
a	22	0.512
b	21	0.488

There are two drug types in the dataset: Amikacin (a) and Gentamicin (g). Amikacin (a) is slightly more common, with a relative frequency of 0.512 (51.2%). Gentamicin (g) accounts for 0.488 (48.8%) of the observations. The near-equal distribution suggests that both drugs were used similarly frequently in the study which may help comparable results when analyzing the effects of the two drugs.

(5)
Frequency table for the Half-life

half. life	Frequency	Relative Frequency
[0.5,1)	1	0.023

[1,1.5)	7	0.163
[1.5,2)	17	0.395
[2,2.5)	11	0.256
[2.5,3)	6	0.140
[3,3.5)	1	0.023

The majority of the half-life values fall within the interval [1.5, 2.0), which accounts for 39.5% of the observations (17 patients). The smallest group is in the interval [3.0, 3.5), with 2.3% of the observations (1 patient). The distribution is concentrated primarily between [1.5, 2.5), suggesting that most patients have a half-life within this range.

(6)
Frequency table for the dosage

dosage	Frequency	Relative Frequency
[0,2)	2	0.047
[2,4)	19	0.442
[4,6)	0	0.000
[6,8)	4	0.093
[8,10)	8	0.186
[10,12)	10	0.233

The majority of patients fall in the dosage interval [2.00, 4.00), accounting for 44.2% of the observations (19 patients). No patients have dosages in the interval [4.00, 6.00).

```
# R code
# 1. (a) create a data named “drug” from the data file drug.csv
drug <- read.csv(file = "drug.csv", stringsAsFactors = FALSE)
# 1. (b) look at a few first lines of data
head(drug)
# 1.(c) the names of the variables in the data
names(drug)


# 2. Describe the data set
# The purpose of the study is to analyze the half-life of aminoglycosides in trauma patients, which is affected by the drug type, dosage, and patient weight.
# This is part of a study by pharmacy researchers to understand drug behavior in a critical care setting.
# Variables in the dataset
```

```
# 1. patient: unique identifier for each patient
# 2. drug: type of drug administered to the patient
# 3. half.life: half-life of the drug in the patient's body
# 4. dosage: dosage of the drug administered to the patient
# sample size:
n <- length(drug$patient)
n # 43

# 3. Determine the Type of Each Variable
str(drug)
# patient: qualitative variable, nominal data
# drug: qualitative variable, nominal data
# half.life: quantitative variable, continuous data
# dosage: quantitative variable, continuous data

# 4. For the type of drugs, use R to construct a frequency table
table(drug$drug)
prop.table(table(drug$drug))
b <- prop.table(table(drug$drug))
round(b, digits = 3)

# 5. For the Half-life, use R to construct a frequency table
a <- cut(x = drug$half.life,
         breaks = c(0.50, 1.00, 1.50, 2.00, 2.50, 3.00, 3.50),
         right = FALSE)
a
b <- table(a)
b
d <- b / sum(b)
round(d, digits = 3)

# 6. For the dosage, use R to construct a frequency table
a <- cut(
  x = drug$dosage,
  breaks = c(0, 2.00, 4.00, 6.00, 8.00, 10.00, 12.00),
  right = FALSE)
b <- table(a)
b
d <- b / sum(b)
round(d, digits = 3)
```