CSCI 2961 – Introduction to Open Source
Quiz 2

Open Book - Open Notes, Laptop but No Internet

November 20, 2015

NAME: Sample. solution

RCS Id:

Part A: Please Answer the following Multiple Choice Questions: [*30 points*]
Circle the number of the correct answer. If you change your answer, clearly cross it out

1. The approximate number of lines of code (order of magnitude) in Linux kernel :
   (a) 19,000
   (b) 190,000
   (c) 1,900,000
   (d) 19,000,000
2. Which one does NOT contribute to making a good (software) community?
   (a) Decent Communication Standards
   (b) Coaching newbies
   (c) Not welcoming non-coding contributors
   (d) Recruitment and Retention
3. Which one of these is the most important for diversity involvement?
   (a) Diversity provides different perspectives and reduces bias.
   (b) Diversity is required by law.
   (c) Diversity means : What is good for women is good for women only.
   (d) Diversity reduces the flame-war
4. Which of the following defines a software community?
   (a) Blog Posts
   (b) Forums and News groups
   (c) Chatrooms
   (d) All of the above
5. How does github profile show/measure one's productivity to the perspectives employers?
   (a) Number of Commits and commit history
   (b) Number of stars
   (c) Number of contributors
   (d) All of the above and the number of followers
6. What Language is NOT used for Scientific Computation?
   (a) FORTRAN
   (b) C++/C
   (c) Python/Scipy/numpy
   (d) Cobol
7. Some of the important issues with Scientific Computation are
   (a) Numerical Accuracy/precision
   (b) Visualization of results
   (c) Database queries
   (d) (a) and (b)

8. What is the leading digit of 3^{100} (back of the envelope calculation $\log_{10}(2) = 0.3010$, $\log_{10}(3) = 0.4771$, $\log_{10}(5) = 0.6990$)

   (a) 3
   (b) 5
   (c) 6
   (d) None of the above

9. In the pygame simulation of angry birds, the force action on the bird after it is launched (if it not moving fast) is

   (a) gravitational force
   (b) frictional force from wind
   (c) Drag (resistance) due to wind
   (d) Tail wind

10. Which language/framework is [redacted] used for statistical computation

    (a) SPSS
    (b) SAS
    (c) R, R Studio
    (d) All of the above

11. The R command flips a fair coin 5 times. (1 is Heads and 0 is Tails)

```
flips<-sample(c(0,1),size=5,replace=TRUE, prob=c(0.5,0.5))
```

    What is the least likely content of flips (least likely outcome of 5 coin tosses)

    (a) 1,1,0,1,0
    (b) 0,1,0,1,1
    (c) 0,0,0,0,0
    (d) 1,0,1,0,0

12. Consider two urns the first with 5 red balls and 3 green balls and the second with 2 red balls and 6 green balls. Your friend randomly selects one ballfrom the first urn and transfers to the second urn, without disclosing the color of the ball. You select the ball from the second urn. What is the probability that the selected ball is green.

    (a) $\frac{17}{24}$
    (b) $\frac{7}{24}$
    (c) $\frac{1}{2}$
    (d) None of the above

13. Which of the following is open hardware ?

    (a) Raspberry Pi
    (b) Intel 386
    (c) Arduino
    (d) AMD A series

14. Physical computing lets you

    (a) play a keyboard made of fruit

    (b) email an alert when a letter is delivered to mail box

    (c) tweet when the clothes washer has completed its cycles.

    (d) All of the above

15. You program an arduino through

    (a) usb

    (b) wifi

    (c) lan

    (d) Arduino cannot be programmed.

Part B: Free response:

(a) [**Community**]You have installed gitstats package in lab 7 as well as gnuplot. Please down load (course github page) https://github.com/rcos/CSCI2961-01 Answer the following questions after running gitstats
[*10 points*]

i. How many contributors are there? Name at least 4 of them.

ii. Who has the third largest commit

iii. How many files are there and the average file size

iv. What is the total lines?

v. How many files have Md extension?

vi. which file types have two largest sizes?

i) 10 mskmoody, jkmcnellis, Severin Ibarluzea, Matt Zanchelli

ii) Severin Ibarluzea

iii) 61, 94946.77 bytes

iv) 1994

v) 26

vi) jpg, pdf

(b) [**Scientific Computation**] In Lab 8, you wrote a word ladder program using networkx and the word data. [10 points] Please answer the following questions:

i. We have words as nodes of the graph and two adjacent words (that is, words in successive steps) differ by one letter. -they differ in exactly one position.(first version). What is the maximum degree of a node (i.e., number of words adjacent to any one word) Assume all words are of length 4.

ii. What will be the maximum degree(bound) in the second version (where three letters are same and one is different). Assume all words are of length 4.

iii. How will you modify your program (first variation) if we are given three words instead of two words. You have to produce a working program. ($O(n^2)$ complexity is acceptable) - any path is alright.

iv. Write a segment of code to generate a three word phrase (all the three words should not be the same) - one method of generating a passwphrase.

(i) 25 * 4 = 100

(ii) 24 * 4 * 4! = 2400

(iii)
```
sp1 = shortest_path(G, w1, w2)
sp2 = shortest_path(G, w2, w3)
sp = sp1 + sp2[1:]
```

(iv)
```
sp = shortest_path(G, 'chaos', 'order')
print sp[0:3]
```

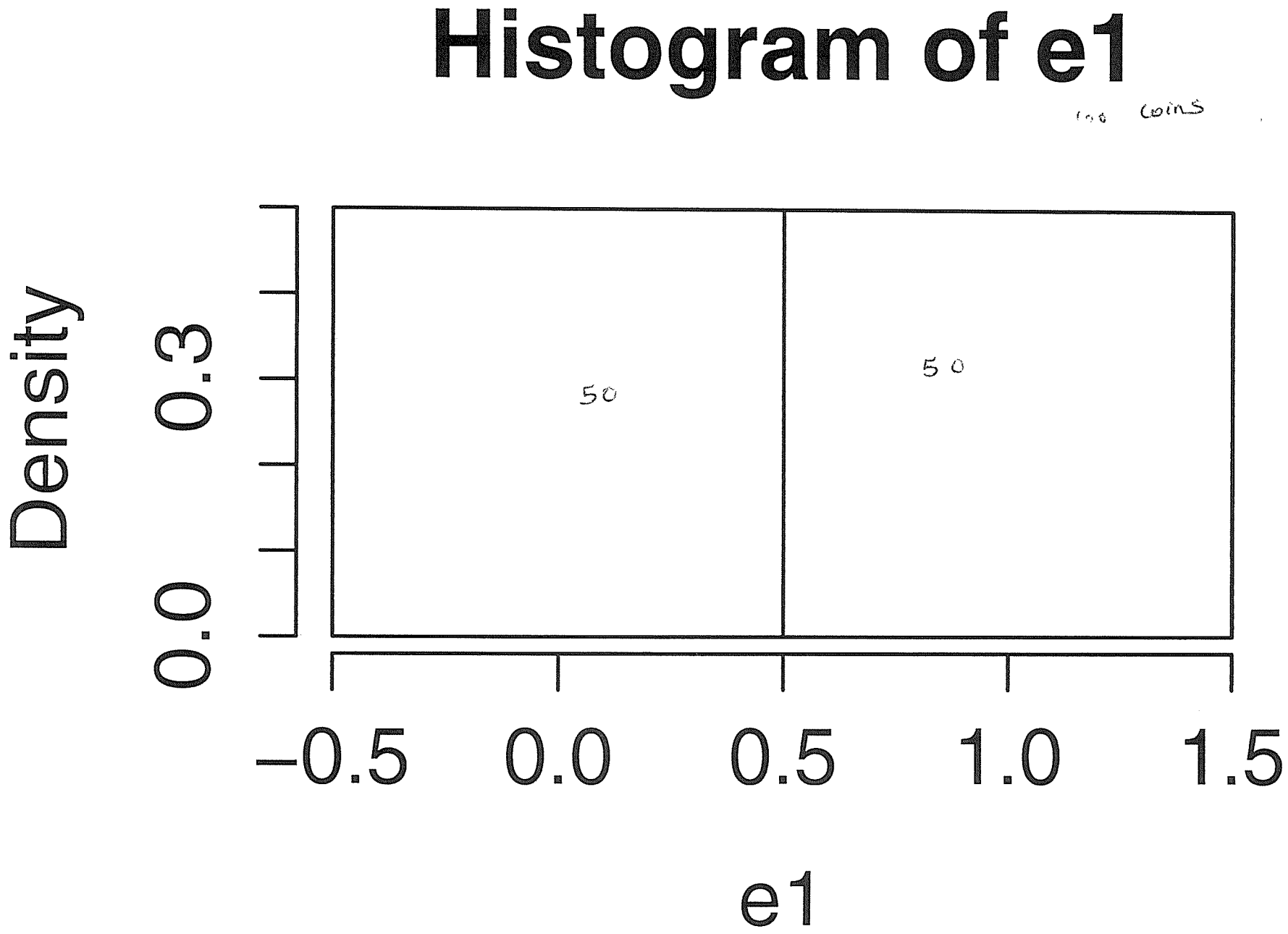
(c) [**Statistical Computing**] In class we did small problems in R for statistical computation. [10 points] In R, you can simulate flipping a coin or rolling a dice by the command

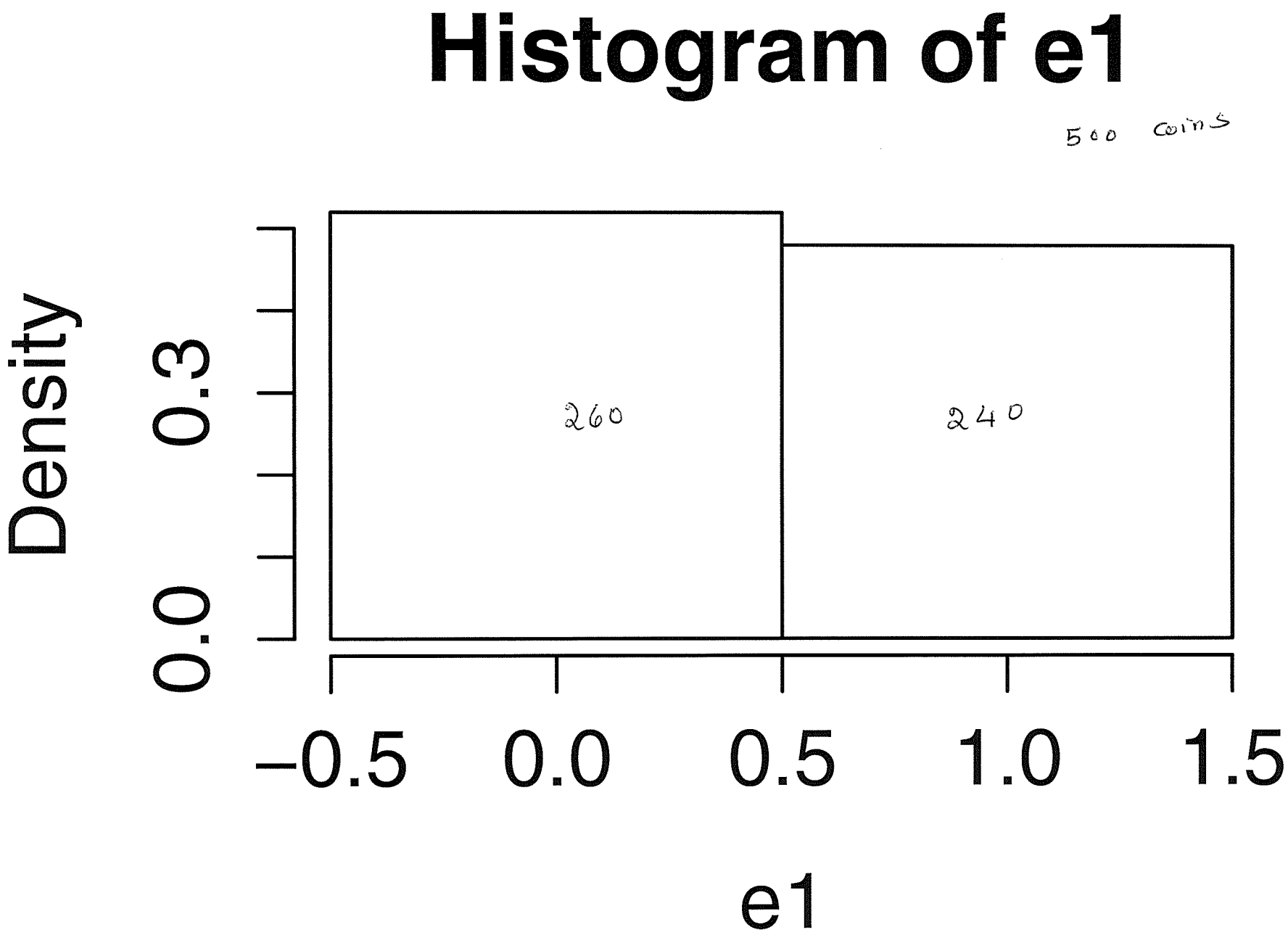
```
e1<-sample(0:1,15,rep=T) ## 1 is head 0 is tail - repeat 15 tosses
d1<-sample(1:6,15,rep=T) ## rolls a die 15 times.
sum(e1==0) ## counts the number of tails
hist(e1,breaks=c(-0.5,0.5,1.5), prob=T) ## Plots a histogram
hist(d1,breaks=c(0.5,1.5,2.5,3.5,4.5,5.5,6.5), prob=T) ## Plots a histogram
```

i. Use R to simulate an experiment of tossing a coin 100 and 500 times. Print the relative histogram and the relative frequency of head and tails for both 100 and 500.

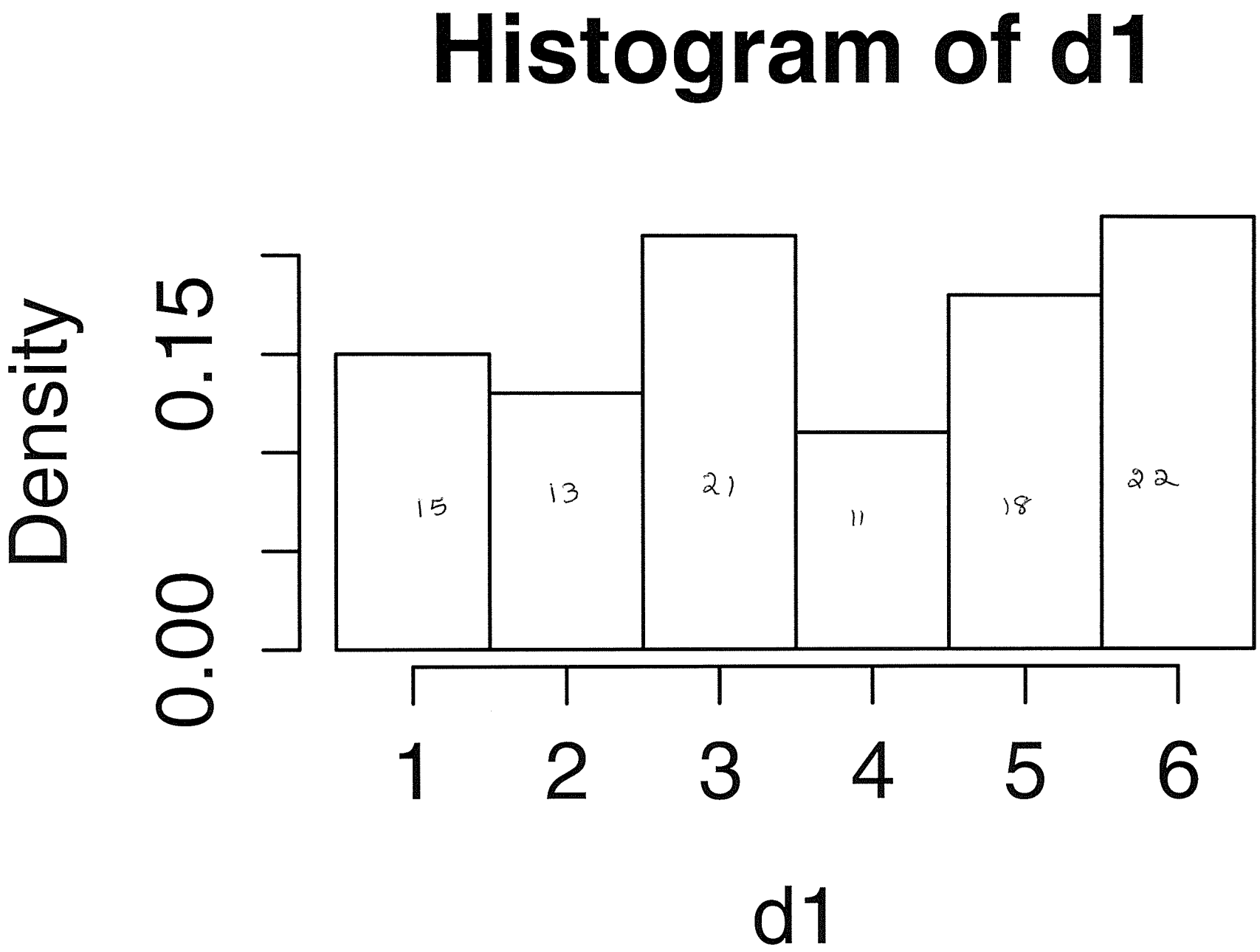
ii. Use R to simulate a rolling a die 100 and 500 times. Print the relative histogram and relative frequencies of 1,2,3,4,5 and 6.

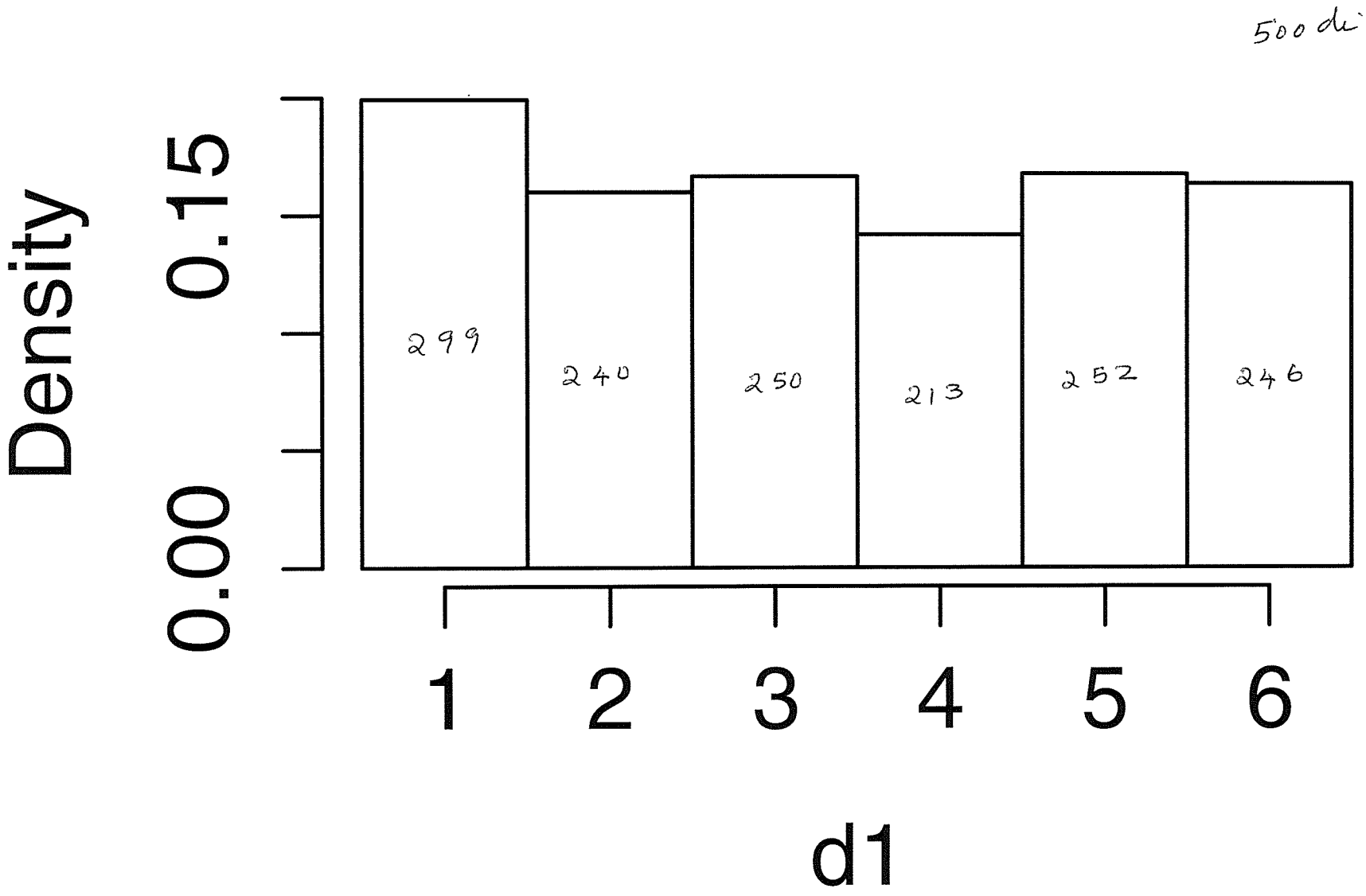
Please see the attached


Histogram of e1
100 coins
Density
0.0
0.3
50
50
−0.5
0.0
0.5
1.0
1.5
e1


Histogram of e1
500 coins
Density
0.0
0.3
260
240
−0.5
0.0
0.5
1.0
1.5
e1

100 dice




Histogram of d1
500 dice
Density
0.00
0.15
299
240
250
213
252
246
1
2
3
4
5
6
d1

(d) [**Open Hardware**]

You have installed arduino in lab 10. Start arduino, look at the code under file⇒examples⇒digital⇒blinkwithoutdelay Answer the following questions. [10 points]

i. Explain the function of the code.

ii. What does millis() function do?

iii. can you make the interval increase in value? How will you change the code to accomplish this?

(i) Turns on and off an LED without using a delay function. Instead it uses the time difference between current time and previous blink is > interval, it blinks.
greater than

ii) millis() returns current time in milliseconds.

iii) you can change the value of interval - you can also increment ~~in~~ value in interval to get LED blinking at different rates.