hw2

2024-10-21

```r
#read data
videodata <- read.table("videodata.txt",header =TRUE)
videodata
```

```
##    time like where freq busy educ sex age home math work own cdrom email grade
## 1   2.0    3     3    2    0    1   0  19    1    0   10    1     0     1     4
## 2   0.0    3     3    3    0    0   0  18    1    1    0    1     1     1     2
## 3   0.0    3     1    3    0    0   1  19    1    0    0    1     0     1     3
## 4   0.5    3     3    3    0    1   0  19    1    0    0    1     0     1     3
## 5   0.0    3     3    4    0    1   0  19    1    1    0    0     0     1     3
## 6   0.0    3     2    4    0    0   1  19    0    0   12    0     0     0     3
## 7   0.0    4     3    4    0    0   1  20    1    1   10    1     0     1     3
## 8   0.0    3     3    4    0    0   0  19    1    0   13    0     0     1     3
## 9   2.0    3     2    1    1    1   1  19    0    0    0    0     0     0     4
## 10  0.0    3     3    4    0    1   1  19    1    1    0    1     0     1     4
## 11  0.0    3     1    4    0    0   0  20    1    0    0    1     0     0     3
## 12  0.0    3     2    4    0    0   0  19    1    0    0    1     0     1     4
## 13  0.0    2     4    1    0    1   0  19    1    1    0    0     0     1     4
## 14  3.0    3     3    2    1    0   0  18    0    0    0    0     0     1     3
## 15  1.0    3     5    2    0    1   0  18    1    1   14    1     0     1     3
## 16  0.0    5    99   99   99   99   1  19    1    0    0    1     0     1     3
## 17  0.0    3     3    4    0    1   1  21    1    0    2    1     0     1     4
## 18  0.0    3     2    3    0    0   1  20    1    0    0    1     0     1     3
## 19  2.0    2     2    2    1    0   1  18    1    0    0    1     0     1     4
## 20  0.0    3    99   99   99   99   0  19    0    0    9    0    99     1     3
## 21  2.0    3     2    2    0    1   1  20    1    0   15    1     0     0     4
## 22  0.0    3     2    3    0    1   1  24    1    0   10    0     0     0     4
## 23  2.0    3     3    1    1    1   1  19    0    0    0    1     0     1     4
## 24  0.0    5    99   99   99   99   0  19    0    0    0    0    99     0     2
## 25  0.0    5    99   99   99   99   1  21    1    0    0    1     0     0     3
## 26  0.0    3     3    4    0   99   0  20    1    1    0    1     0     1     3
## 27  0.0    2     3    4    0    0   1  22    1    1    0    1     1     1     4
## 28  0.0    3     2    3    0    0   1  18    0    0   10    0     0     0     3
## 29  0.0    4     3    4    0    0   1  19    1    1    0    1     0     1     3
## 30  0.0    4     3    4    0    1   0  20    1    0    0    1     0     1     3
## 31  0.0    4     3    4    0    0   0  19    1    1    0    0     0     1     4
## 32  1.0    3     5    2    0    1   1  19    1    0   99    1     1     1     3
## 33  0.0    4     2    3    0    0   1  19    1    1    0    1     1     1     3
## 34  0.0    2     1    3    0    0   1  19    1    0   10    0     0     1     3
## 35  0.0    3     3    1    0    1   0  19    1    0   12    1     0     1     3
## 36  0.1    2     6    2    0    1   1  18    0    0    5    1     1     1     4
## 37  0.5    4     3    3    0    0   0  19    1    0    0    1     0     0     3
## 38  1.0    3     4    4   99    1   0  20    1    0    0    1     0     1     3
## 39  0.0    3     1    4    0    0   0  19    0    0    0    0     0     1     3
## 40  0.0    3     3    2    1    1   0  20    1    0   20    1     0     0     3
```

```
## 41  0.0    4    99    99     0     0    0  19     1     0     5    1      0      1      4
## 42  2.0    2     4     2     0     0    1  19     1     0     0    1      0      1      3
## 43  2.0    3     4     2     0     1    1  19     0     0    10    1      1      1      3
## 44  0.5    3     4     2     1     0    1  19     1     1    99    0      0      1      4
## 45  0.0    3     4    99     0     0    1  19     1    99    99    1      0      1      3
## 46  2.0    3     5     2     1     1    1  19     1     0    15    0      0      1      4
## 47  0.0    3     4     2     0     0    1  19     1     1     0    1      1      0      3
## 48  0.0    3     4     3     1     1    0  19     1     1     0    1      0      1      3
## 49  0.0   99    99    99    99    99    1  20     1     1    15    1      1      1      3
## 50  2.0    3     2     2     0     0    1  19     1     0     0    1      0      1      4
## 51  0.0    4    99     4     0    99    0  18     1     1     0    1      0      1      3
## 52  0.0    5    99    99    99    99    0  20     1     1     0    1      0      1      3
## 53  0.5    3     2     2     0     0    1  19     1     0    16    1      0      1      3
## 54  3.0    2     3     1     0     1    1  18     1     0     7    1      0      1      3
## 55  0.0    3     1     3     0     0    1  19     0     0    15    0      0      1      3
## 56  0.0    4     3     3     0     1    0  21     1     0     5    1      0      1      4
## 57  0.0    4     3     4     0     0    0  18     1     0     0    1      0      1      4
## 58  4.0    2    99     1     1     1    1  20     1     0     6    1      0      0      4
## 59 30.0    2    99     2     1     0    1  19     0     1     0    0      0      1      3
## 60 14.0    2    99     1     1     0    0  19     1     0     0    1      0      1      2
## 61  0.0    3     1     3     0     1    1  19     0     0     0    0      0      0      3
## 62  0.0    2    99     3     0     1    0  21     0     0    18    1      0      0      2
## 63  0.0    4    99    99     0     0    0  20     1     0     0    1      1      1      4
## 64  0.5    2     3     2     1     1    1  19     1     0    20    1      1      1      4
## 65 14.0    2     4     1     1     1    1  18     1     0    35    1      1      1      3
## 66  1.0    2     4     2     0     1    1  19     1     0    19    1      0      1      4
## 67  0.0    4     2     4     0     0    1  18     1     0     0    1      0      1      4
## 68  0.0    2     5     2     1     1    1  20     1     1    20    0      0      1      4
## 69  1.5    3     3     2     0     1    0  19     1     1     8    1      0      0      3
## 70  0.0    4     2     4     0     0    1  19     1     1     0    1      0      0      3
## 71  0.0    3     4     3     0     0    1  19     1     1     0    1      0      1      3
## 72  2.0    2    99     2     1    99    1  20     1     0    10    1      1      1      3
## 73  0.0    5    99    99    99    99    1  19     0     1    16    1      0      1      3
## 74  0.0    3     3     2     0     0    1  23     0     0     0    1      0      1      4
## 75  0.0    5    99    99    99    99    0  19     1     0    40    0      0      1      3
## 76  0.0    2     3     3     0     1    0  20     0     0     0    1      1      1      2
## 77  0.0    5    99    99    99    99    0  19     1     1    15    1      0      1      3
## 78  0.0    3     3     4     0     0    1  19     1     0    16    0      0      1      3
## 79  0.0    2     3     3     0     1    1  25     0     0    55    1      0      1      3
## 80  2.0    2     1     2     0     1    1  19     1     0    10    1      0      1      3
## 81  1.0    2     3     1     0     0    1  20     1     1     0    1      0      1      4
## 82  0.0    1    99    99    99    99    1  19     1     1    10    1      0      0      4
## 83  0.0    3     2     4     0     0    0  19     0     1    15    0     99      1      2
## 84  2.0    2     3     2     0     1    1  21     0     0    15    0      0      1      4
## 85  0.0    3     2     4     0     0    0  18     1     1    15    0     99      0      3
## 86  2.0    2     4     2     1     0    1  19     0     0     0    1      0      1      3
## 87  2.0    3     4     2     1     0    1  19     1     0     0    1     99      1      4
## 88  5.0    3     3     2     0     1    0  20     1     0    14    1      1      1      4
## 89  0.0    2     5     4     0     1    0  33     1     0    40    1      0      0      2
## 90  3.0    3     3     2     0     0    1  19     1     0     5    1      1      1      3
## 91  0.0    3     4     3     0     1    0  19     0     1     5    1      0      1      2
```

```
#read data
videoMultiple <- read.table("videoMultiple.txt",header = TRUE)
```

```
videoMultiple
```

```
##    action adv sim sport strategy relax coord challenge master bored
## 1       0   0   0     0        1     1     0         1      1     0
## 2       0   1   0     0        1     0     0         0      0     1
## 3       1   0   0     1        1     1     0         0      0     0
## 4       0   0   0     0        1     0     0         1      0     0
## 5       0   0   0     0        1     1     0         1      1     0
## 6       1   0   0     1        1     1     0         0      1     1
## 7       1   0   0     1        0     1     0         0      0     0
## 8       0   0   0     1        1     1     0         0      0     1
## 9       1   0   0     1        0     0     0         0      0     0
## 10      1   1   1     0        1     1     0         0      0     0
## 11      0   0   0     0        1     1     0         0      0     0
## 12      0   0   0     0        1     1     0         0      0     0
## 13      1   0   0     0        1     1     0         0      1     0
## 14      0   0   0     0        1     1     0         0      1     1
## 15      1   0   0     0        1     1     0         0      0     0
## 16      0   0   0     0        0     0     0         0      0     0
## 17      0   0   0     1        1     1     0         1      1     0
## 18      1   1   1     0        1     1     0         0      0     1
## 19      1   1   1     1        1     0     0         0      1     0
## 20      0   0   0     0        0     0     0         0      0     0
## 21      1   1   0     1        1     1     0         1      1     0
## 22      1   0   0     1        1     1     0         0      0     0
## 23      0   0   0     0        1     1     0         1      0     1
## 24      0   0   0     0        0     0     0         0      0     0
## 25      0   0   0     0        0     0     0         0      0     0
## 26      0   0   0     0        1     0     0         0      0     0
## 27      1   1   0     0        0     1     0         0      0     0
## 28      1   0   1     0        0     0     0         0      1     0
## 29      1   0   1     0        0     1     0         0      0     1
## 30      0   0   0     0        1     1     0         0      0     0
## 31      0   1   0     0        1     0     0         0      0     1
## 32      1   1   1     1        1     1     0         1      0     1
## 33      0   0   0     1        0     1     0         0      0     0
## 34      1   1   0     1        0     1     0         0      1     0
## 35      0   0   0     0        1     1     0         0      1     0
## 36      1   1   1     1        1     1     0         1      1     0
## 37      0   0   0     0        1     0     0         0      0     0
## 38      1   0   0     0        1     1     0         0      1     0
## 39      1   0   0     1        0     1     0         0      0     0
## 40      0   0   0     0        1     1     0         1      0     1
## 41      0   0   0     0        1     1     0         0      0     1
## 42      1   0   0     0        1     1     0         0      0     0
## 43      1   1   0     0        1     1     0         1      0     0
## 44      1   0   1     1        0     1     0         0      0     0
## 45      1   1   1     0        1     1     0         1      0     1
## 46      1   0   0     1        1     0     0         1      1     0
## 47      1   1   0     1        1     1     0         0      0     1
## 48      0   1   1     1        1     0     0         1      1     1
## 49      0   0   0     0        0     0     0         0      0     0
## 50      0   1   0     0        1     1     0         1      0     0
## 51      0   0   0     0        1     0     0         0      0     1
```

```
## 52      0   0   0     0        0     0     0         0      0     0
## 53     NA  NA  NA    NA       NA    NA    NA        NA     NA    NA
## 54     NA  NA  NA    NA       NA    NA    NA        NA     NA    NA
## 55     NA  NA  NA    NA       NA    NA    NA        NA     NA    NA
## 56     NA  NA  NA    NA       NA    NA    NA        NA     NA    NA
## 57      0   1   0     0        1     1     0         0      0     0
## 58      1   0   0     1        1     0     0         1      1     1
## 59      1   0   0     1        0     1     0         0      0     0
## 60      1   1   0     0        1     1     0         0      0     1
## 61      1   0   0     1        0     1     0         0      1     1
## 62      1   0   0     0        1     0     0         0      1     0
## 63      0   0   0     0        0     0     0         0      0     0
## 64      1   1   1     1        1     1     0         0      0     1
## 65      0   0   0     1        0     1     1         0      0     0
## 66      1   1   0     1        0     1     0         0      1     0
## 67      0   0   0     0        0     0     0         0      0     0
## 68      1   1   1     1        1     1     0         0      0     0
## 69      0   0   0     0        1     1     0         1      0     0
## 70      0   0   0     1        0     1     0         0      0     0
## 71      0   0   1     1        1     1     0         0      0     0
## 72      1   1   0     0        1     1     0         0      1     0
## 73      0   0   0     0        0     0     0         0      0     0
## 74      0   0   0     1        1     1     0         0      1     1
## 75      0   0   0     0        0     0     0         0      0     0
## 76      1   0   0     0        0     0     0         0      1     0
## 77      0   0   0     0        0     0     0         0      0     0
## 78      1   0   0     1        1     1     0         0      0     1
## 79      1   0   0     0        1     0     0         0      0     1
## 80      1   0   1     0        0     1     1         1      1     0
## 81      1   0   0     1        1     1     0         1      1     0
## 82      0   0   0     0        0     0     0         0      0     0
## 83      0   1   0     1        1     1     0         0      0     0
## 84      1   1   0     0        0     1     0         0      0     1
## 85      1   0   0     0        1     1     1         0      0     0
## 86      1   1   0     1        1     1     0         1      0     0
## 87      0   0   0     1        0     0     0         0      0     0
## 88      1   1   0     0        1     1     0         1      1     0
## 89      1   0   1     0        0     1     1         0      0     0
## 90      0   0   0     1        0     0     0         0      0     1
## 91      1   0   0     0        1     1     0         1      0     0
##            other graphic time frust lonely rules cost boring friends point
## 1                      0    1     0      0     0    1      0       0     1
## 2                      0    1     1      0     0    0      0       0     0
## 3                      0    0     0      0     0    1      0       0     0
## 4                      0    1     0      0     0    0      0       0     0
## 5                      0    0     0      0     1    1      0       0     0
## 6                      0    1     1      0     0    1      0       0     0
## 7      Brainless       0    0     0      0     1    0      0       0     0
## 8                      1    0     0      0     0    0      0       0     0
## 9    like sports       1    0     0      0     0    1      1       0     0
## 10                     0    0     0      0     1    0      0       0     0
## 11                     0    0     1      0     1    0      1       0     1
## 12                     0    1     1      0     0    0      0       0     0
## 13                     0    0     1      1     0    0      0       0     0
```

```
## 14                    0    1     0      0     0     0      0       0     0
## 15                    0    1     0      0     0     1      0       0     0
## 16                    0    0     0      0     0     0      1       0     1
## 17                    0    1     0      0     0     0      1       0     1
## 18    excitement      0    1     0      0     0     0      0       0     0
## 19                    0    1     0      0     0     0      0       0     0
## 20                    0    0     0      0     0     0      0       0     1
## 21                    0    1     1      0     0     1      0       0     0
## 22                    0    0     1      0     0     1      0       0     0
## 23                    0    0     0      0     1     0      0       0     0
## 24                    0    1     0      0     0     1      0       0     1
## 25                    0    0     0      0     0     0      1       0     1
## 26     addictive      0    0     0      0     0     0      0       0     0
## 27                    1    0     0      0     0     0      0       0     0
## 28                    0    1     0      0     0     0      0       0     0
## 29                    0    0     1      0     0     0      0       0     1
## 30                    0    1     1      0     1     0      0       0     0
## 31                    0    1     0      0     0     0      1       0     1
## 32                    0    0     1      0     1     0      0       0     0
## 33                    0    1     0      0     0     0      1       0     1
## 34                    0    1     0      0     0     1      0       0     1
## 35                    0    1     0      0     0     0      0       0     0
## 36                    1    1     0      0     0     1      0       0     0
## 37                    0    1     0      0     1     0      1       0     0
## 38                    1    0     0      0     1     1      0       0     0
## 39                    1    0     0      0     0     0      0       0     0
## 40                    0    1     1      0     0     0      0       0     0
## 41                    1    1     0      0     0     0      0       0     1
## 42                    1    0     0      0     0     1      0       0     1
## 43                    0    1     0      0     0     1      0       0     0
## 44                    0    1     1      0     0     1      0       0     0
## 45                    0    1     0      0     0     1      0       0     1
## 46                    1    0     1      0     1     0      0       0     0
## 47                    1    0     0      0     0     0      0       0     1
## 48                    0    0     1      0     1     1      0       0     0
## 49                    0    1     0      0     0     0      1       0     1
## 50                    0    0     1      0     0     1      0       0     0
## 51                    0    0     0      0     0     0      1       0     1
## 52                    0    0     0      0     1     0      1       0     1
## 53                   NA   NA    NA     NA    NA    NA     NA      NA    NA
## 54                   NA   NA    NA     NA    NA    NA     NA      NA    NA
## 55                   NA   NA    NA     NA    NA    NA     NA      NA    NA
## 56                   NA   NA    NA     NA    NA    NA     NA      NA    NA
## 57                    0    1     0      0     0     0      0       0     0
## 58                    0    0     0      0     0     0      0       0     0
## 59       love it      1    0     0      0     0     1      0       0     0
## 60 lowers stress      0    1     0      0     0     0      0       0     1
## 61                    0    0     1      1     0     1      0       0     0
## 62                    0    1     0      0     0     1      0       0     0
## 63                    0    1     0      0     0     0      0       0     0
## 64                    1    0     0      0     0     1      0       0     1
## 65                    1    1     0      0     0     1      0       0     0
## 66                    1    0     0      0     0     1      0       0     0
## 67                    0    0     0      0     0     0      0       0     1
```

```
## 68                    1    0     1      0     1    1      0       0     0
## 69                    0    1     0      0     0    0      0       0     0
## 70                    0    0     0      0     1    0      0       1     1
## 71           fun      0    1     0      0     0    0      0       0     0
## 72                    1    0     0      0     0    1      0       1     0
## 73                    0    1     1      0     1    0      0       0     0
## 74                    1    0     0      0     0    1      0       0     0
## 75                    0    0     0      0     0    0      1       0     1
## 76                    0    1     0      0     0    0      0       0     0
## 77                    0    0     0      0     0    0      1       0     1
## 78                    0    0     0      0     0    1      0       0     1
## 79                    0    1     1      0     0    1      0       0     0
## 80                    1    0     0      1     0    0      0       0     0
## 81                    0    1     0      0     0    1      0       0     0
## 82                    0    0     1      0     0    1      0       0     0
## 83                    1    1     0      0     0    1      0       0     1
## 84                    1    0     0      0     0    1      0       0     0
## 85                    0    0     1      0     0    0      1       0     1
## 86                    1    1     0      0     0    1      0       0     0
## 87 competiveness      0    0     0      0     1    0      0       0     1
## 88                    0    1     0      1     0    0      0       0     1
## 89                    1    0     0      0     1    0      0       0     0
## 90                    0    1     1      0     0    1      0       0     0
## 91                    1    1     1      0     0    0      0       0     0
##                 other2
## 1
## 2
## 3
## 4
## 5
## 6
## 7       too realistic
## 8
## 9        unproductive
## 10
## 11
## 12
## 13
## 14
## 15
## 16       unproductive
## 17
## 18
## 19
## 20    do other things
## 21
## 22
## 23
## 24
## 25
## 26
## 27
## 28
## 29
```

```
## 30
## 31
## 32
## 33
## 34
## 35
## 36   gives me blisters
## 37
## 38
## 39         hate losing
## 40
## 41
## 42
## 43
## 44
## 45
## 46
## 47
## 48
## 49
## 50
## 51
## 52
## 53
## 54
## 55
## 56
## 57
## 58
## 59
## 60        unproductive
## 61
## 62
## 63
## 64
## 65
## 66
## 67
## 68
## 69
## 70
## 71
## 72 the computer cheats
## 73
## 74
## 75        unproductive
## 76
## 77
## 78
## 79
## 80
## 81
## 82
## 83
```

```
## 84
## 85
## 86
## 87
## 88
## 89
## 90
## 91
```

1.

```
#find the point estimator
point_estimate_fraction <- sum(videodata$time >0) / length(videodata$time)

confidence_level <- 0.95
z <- qnorm((confidence_level+1)/2)

#find proportion standard error
se <- sqrt(point_estimate_fraction * (1-point_estimate_fraction)) / sqrt(length(videodata))

#find lower and upper confidence interval
lower_interval_estimate_fraction <- point_estimate_fraction - 2 * se
lower_interval_estimate_fraction
```

```
## [1] 0.1238106
```

```
higher_interval_estimate_fraction <- point_estimate_fraction + 2*se
higher_interval_estimate_fraction
```

```
## [1] 0.6234421
```

37.4% of people play video game in the week prior to the survey.

3.

```
#find the point estimator
point_estimate_average <- mean(videodata$time)

confidence_leve <- 0.95
z <- qnorm((1+confidence_level)/2)

#get the variance of data
variance <- 1/length(videodata$time) * sum((videodata$time - point_estimate_average)**2)

#find average standard error
se <- sqrt(variance) / sqrt (length(videodata$time))

#lower and upper 95% confidence interval
lower_interval_estimate_average <- point_estimate_average - 2*se
higher_interval_estimate_average <- point_estimate_average + 2*se

lower_interval_estimate_average
```

```
## [1] 0.4553374
```

```
higher_interval_estimate_average
```

```
## [1] 2.030377
```