a.

```
data_frame <- read.table("var4.txt")
X <- data_frame$V1
print(X)
```

```
##  [1] 1 1 0 1 0 0 1 1 0 1 0 0 1 1 0 0 0 1 1 0 0 0 0 0 0 1 1 0 0 0 0 1 1 0 0 0 0 1
## [39] 1 1 0 0 1 0 1 0 1 0 0 0 0 1 0 1 1
```

```
length(X)
```

```
## [1] 55
```

b. Wilson method for confidence interval, theta_est = mean(X)

```
a = 1 - 0.84
z <- qnorm(1 - a / 2)
n <- length(X)
est = mean(X)
left <- (n*est + (z^2) / 2) / (n + z^2) - z * sqrt(n*est*(1-est) + (z^2)/4)/(n+z^2)
right <- (n*est + (z^2) / 2) / (n + z^2) + z * sqrt(n*est*(1-est) + (z^2)/4)/(n+z^2)
print(c(left, right))
```

```
## [1] 0.3291535 0.5128803
```

c)

```
conf_int <- function(X, gamma) {
  a = 1 - gamma
  z <- qnorm(1 - a / 2)
  n <- length(X)
  est = mean(X)
  left <- (n*est + (z^2) / 2) / (n + z^2) - z * sqrt(n*est*(1-est) + (z^2)/4)/(n+z^2)
  right <- (n*est + (z^2) / 2) / (n + z^2) + z * sqrt(n*est*(1-est) + (z^2)/4)/(n+z^2)
  return(c(left, right))
}
print(conf_int(X, 0.84))
```

```
## [1] 0.3291535 0.5128803
```