HW8

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a)

```r
nsim <- 1000000
complete <- c()

set.seed(740)
for (i in 1:nsim) {
  legs <- 16
  distances <- rnorm(legs, 200, sqrt(1225))

  ss <- 10/1.1
  n <- 10
  c <- 10/.95

  mileage <- sample(
    c(ss, c, n),
    size = legs,
    prob = c(.25, .4, .35),
    replace = T
  )
  liters <- distances / mileage
  complete[i] <- sum(liters) <= 325
}

mean(complete)
```

```
## [1] 0.59229
```

The probability Santa is able to complete his trip without needing to refuel is about .5923

b)

```r
nsim <- 100000
tanks <- c(356,356.2,356.4,356.6,356.8,357)
prob <- c()

set.seed(740)
for (j in tanks) {
  complete <- c()
  for (i in 1:nsim) {
    legs <- 16
```

```
    distances <- rnorm(legs, 200, sqrt(1225))

    ss <- 10/1.1
    n <- 10
    c <- 10/.95

    mileage <- sample(
      c(ss, c, n),
      size = legs,
      prob = c(.25, .4, .35),
      replace = T
    )
    liters <- distances / mileage
    complete[i] <- sum(liters) <= j
  }
  prob <- cbind(prob, mean(complete))
}

rbind(tanks,prob)
```

```
##             [,1]       [,2]       [,3]       [,4]       [,5]    [,6]
## tanks 356.00000 356.20000 356.40000 356.60000 356.80000 357.000
##         0.98898   0.98922   0.99091   0.99003   0.99051   0.991
```

Santa will complete his journey 99% of the time when his sleigh tank is 356.4 liters