Name: _____

Directions: Frequently save your work to **handin** and your USB key! No quizzes accepted with timestamp past 5:05 p.m. Submit a **.tar** file (even though just one file will be in it) with naming convention as in the homework (but with only names of those present).

Assumptions: In all problems, we are working with electronic components with lifetime L, whose population distribution is assumed to be exponential with some unknown population value λ. We test a random sample of n components, finding their lifetimes to be $L_1, ..., L_n$.

Place your answer to Problem i in a file **Probi.R**.

1. (35) Write a function with call form

```
lmbdci(lvec)
```

where the argument **lvec** is the vector $(L_1, ..., L_n)'$, as above, returning a two-component vector representing the endpoints of an approximate 95% confidence interval $E(L)$.

Feel free to call R's **mean()**, **var()** and/or **sd()** functions. However, for full credit, do not use the usual s^2; instead, use a quantity that exploits the fact that we are assuming an exponential distribution.

2. (35) Write a function with call form

```
estcdf(lvec,t)
```

which returns the estimated value of $F_L(t)$, where t is a number between $-\infty$ and ∞.

3. (30) Write a function with call form

```
plotestcdf(lvec,ubound)
```

uses **ggplot2** to plot the function in Problem 2, from 0 to **ubound**.

Solutions:

1. From the text, we know that

$$Var(L) = 1/\lambda^2 \tag{1}$$

So, instead of s use $1/\widehat{\lambda} = \overline{L}$. The CI is then

$$\overline{L} \pm 1.96\overline{L}/\sqrt{n} \tag{2}$$

2.

```
estcdf <- function(lvec,t) {
   lambdahat <- 1 / mean(lvec)
   1 - exp(lambdahat * t)
}
```