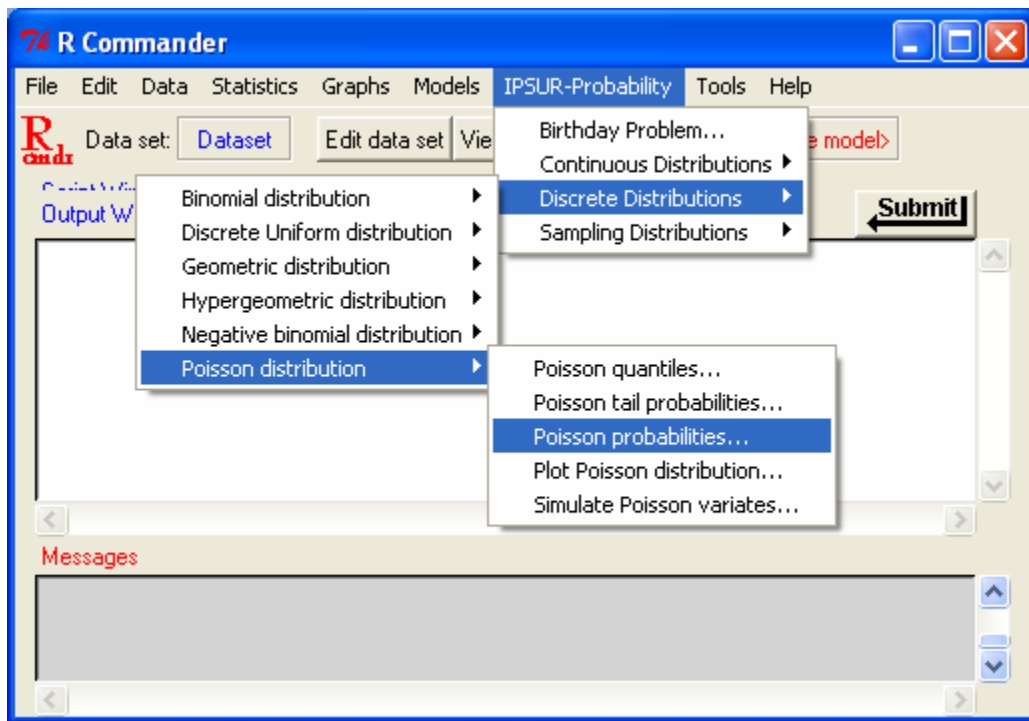


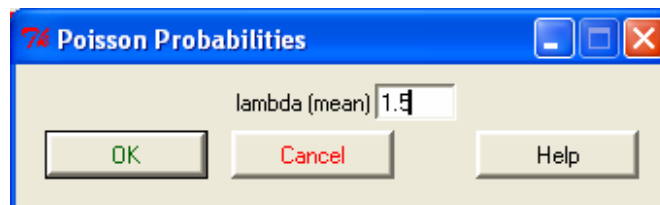
Poisson Probabilities with R

Example: Customers arrive at a travel agency at a mean rate of 3 per 20 minutes from 10:00 a.m. to 2:00 p.m. Assuming that the customers' arrivals follow a Poisson process. Find the probability that no customers will arrive between 12:50 to 1:00 (so that you can sneak out for a quick lunch).

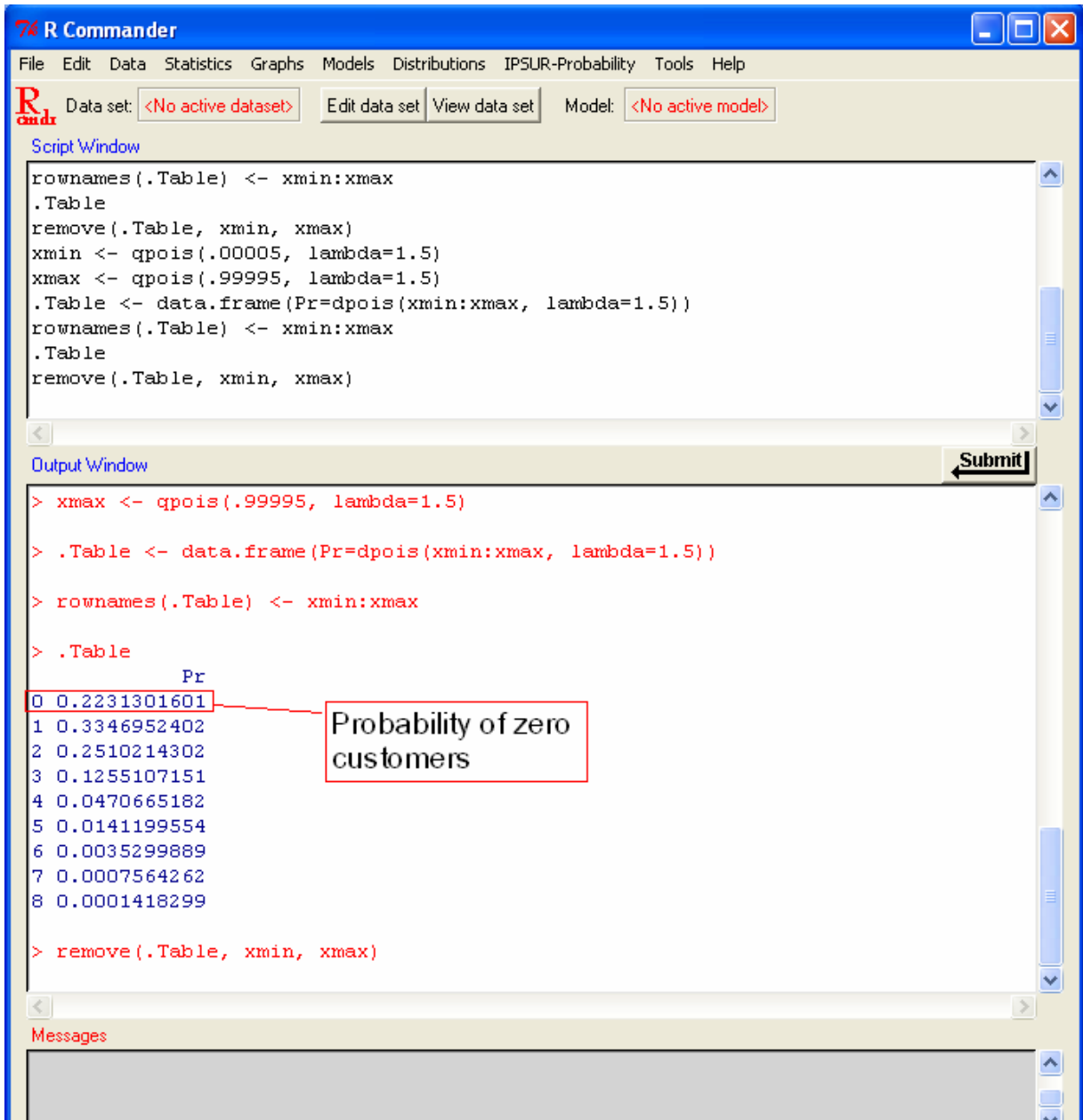
- 1) First determine the average per time interval asked. In this example, the time interval would be 10 minutes. Given the average per 20 minutes is 3, the average per 10 minutes would be 1.5.
- 2) Then from R Commander, click on **IPSUR-Probability/Discrete Distributions/Poisson distributions/Poisson probability...**



- 3) Enter the mean from part 1) into the dialog box.



- 4) Use the table provided in the display box of IPSUR to determine the probability of 0 customers within ten minutes.



The screenshot shows the R Commander interface. The Script Window contains the following R code:

```
rownames(.Table) <- xmin:xmax
.Table
remove(.Table, xmin, xmax)
xmin <- qpois(.00005, lambda=1.5)
xmax <- qpois(.99995, lambda=1.5)
.Table <- data.frame(Pr=dpois(xmin:xmax, lambda=1.5))
rownames(.Table) <- xmin:xmax
.Table
remove(.Table, xmin, xmax)
```

The Output Window shows the execution of the code, resulting in a table of probabilities:

```
> xmax <- qpois(.99995, lambda=1.5)
> .Table <- data.frame(Pr=dpois(xmin:xmax, lambda=1.5))
> rownames(.Table) <- xmin:xmax
> .Table
      Pr
0 0.2231301601
1 0.3346952402
2 0.2510214302
3 0.1255107151
4 0.0470665182
5 0.0141199554
6 0.0035299889
7 0.0007564262
8 0.0001418299
> remove(.Table, xmin, xmax)
```

A red box highlights the value 0.2231301601 in the output, with a red arrow pointing to a text box that says "Probability of zero customers".

The probability of $X = x$ is listed and the probability of $X = 0$ is around 0.2231.