

Monte Carlo Methods and Computer Arithmetics

HW 2 of STAT 5361 Statistical Computing

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Abstract

Use Monte Carlo Methods to approach $\Phi(t)$ and explain some computer arithmetics.

1 Monte Carlo Methods

1.1 Principles

The CDF of standard norm distribution is

$$\Phi(t) = \int_{-\infty}^t \frac{1}{\sqrt{2\pi}} e^{-y^2/2} dy \quad (1)$$

by the Monte Carlo methods

$$\hat{\Phi}(t) = \frac{1}{n} \sum_{i=1}^n I(X_i \leq t) \quad (2)$$

where X_i 's are iid $N(0, 1)$ variables.

1.2 Approximation Outcomes

The approximation is implemented at $n \in \{10^2, 10^3, 10^4\}$ at $t \in \{0.0, 0.67, 0.84, 1.28, 1.65, 2.32, 2.58, 3.09, 3.72\}$. The outcome table with true values is shown below.

Table 1: Approximation Outcomes with True Values

First Header	Second Header
Content Cell	Content Cell
Content Cell	Content Cell

2 Computer Arithmetics

This is an R Markdown document. Markdown is a simple formatting syntax for authoring HTML, PDF, and MS Word documents. For more details on using R Markdown see <http://rmarkdown.rstudio.com>.

When you click the **Knit** button a document will be generated that includes both content as well as the output of any embedded R code chunks within the document. You can embed an R code chunk like this:

```
summary(cars)
```

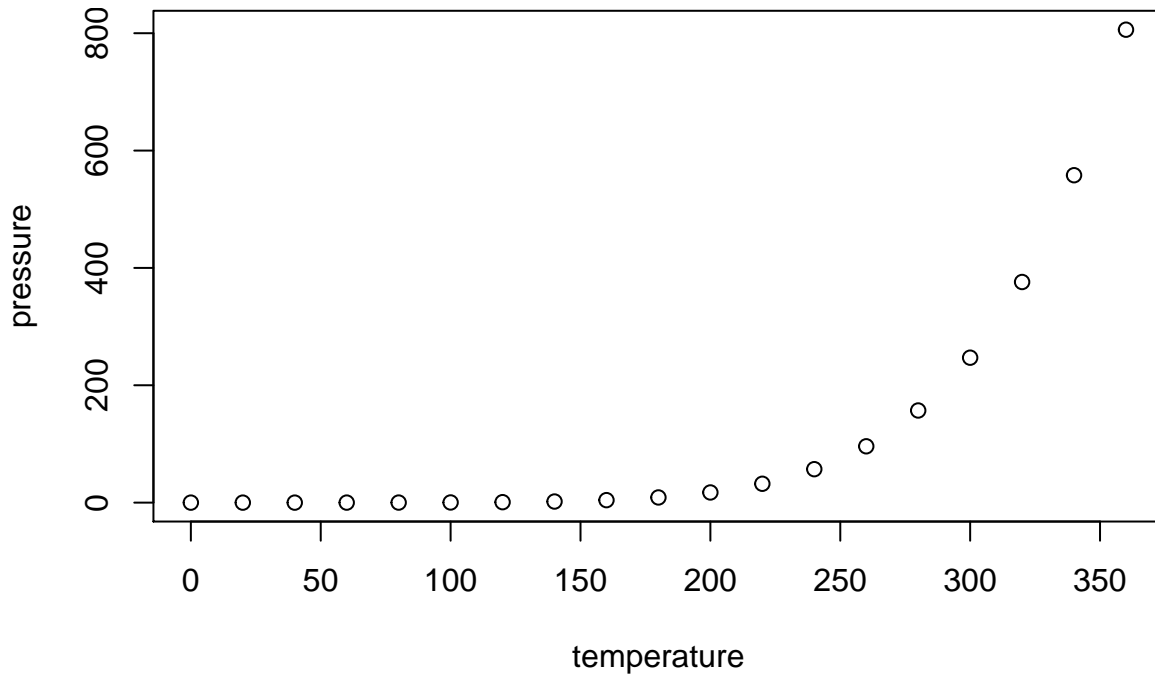
```
##           speed           dist
```

```
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```

```
## Min.   : 4.0   Min.   : 2.00
## 1st Qu.:12.0   1st Qu.: 26.00
## Median :15.0   Median : 36.00
## Mean   :15.4   Mean   : 42.98
## 3rd Qu.:19.0   3rd Qu.: 56.00
## Max.   :25.0   Max.   :120.00
```

2.1 Including Plots

You can also embed plots, for example:



Note that the `echo = FALSE` parameter was added to the code chunk to prevent printing of the R code that generated the plot.