1 Introduction

R is a programming environment that facilitates the analysis and visualization of data. In the first section of this report simple R functions are demonstrated for creating and plotting two-dimensional data. In the second section, distances between points in high-dimensional spaces are investigated.

2 Plotting Sine Curves

2.1 Method

Examples of plots of $y = \sin(x)$ for $x = 0, 0.1\pi, 0.2\pi, \ldots, 6\pi$ are shown here. Samples from a sine curve were generated using the R code

```r
x <- seq(0, 6*pi, by=pi/10)
y <- sin(x)
```

This produces two vectors, $x$ and $y$, each of length 61. These points can be plotted by

```r
plot(x, y)
```
resulting in Figure 1. The postscript file for this plot was produced using

```r
dev.copy2eps(file="plot1.eps")
```

Note that only the points are shown, as open circles. To plot just the curve, use
plot(x, y, type="l")
and to plot both points and lines, use
plot(x, y, type="b")
shown in Figure 2.

The x axis tick labels can be much prettier by removing the x axis resulting from the plot function by including the argument xaxt="n" and following the call to plot with a call to axis using expression in the list of tick labels. Help on accomplishing this can be found by searching www.google.com using terms “axis”, “expression”, and “xaxt”. The example shown in Figure 3 is obtained using

plot(x, y, xaxt="n", type="b")
atx <- seq(0, 6*pi, by=pi)
axis(1, at=atx, labels=expression(0, pi, 2*pi, 3*pi, 4*pi, 5*pi, 6*pi))

2.2 Results
For many assignments, your report should be structured with all results of your experiments reported in this section.

3 High-Dimensional Spaces
High-dimensional spaces are weird. The following experiments show this.
3.1 Method

3.2 Results

4 Discussion

In this section, discuss observations you make regarding your results. Include discussions of the results you obtained that you expected, results that surprised you and speculation about what caused them. Come up with some additional experiments to support your speculation.

Also discuss any problems you encountered in completing this assignment, and really cool, exciting new things you learned.

Include a list of references at the end of the report of any sources you found useful. Include citations in your text for each one used. For example, publicly available R documentation was consulted in completing this report [1, 2].

5 Conclusions

Some reports will include a Conclusions section. If the report describes experiments, such as ones to compare the performance of several algorithms, the Conclusions section is where you concisely state your findings. Always include limitations of the experiments that restrict the generality of your conclusions.

References

[1] Anderson, C., Teach Yourself R, http://www.cs.colostate.edu/~anderson/cs545/class_material/TeachYourselfR.pdf, 2004.
Figure 3: Graph from Figure 2 with prettier x axis labels. The LaTeX file shows how to include the [H] placement specifier that requires the float package.
[2] Venables, W.N. and Ripley, B.D, *An Introduction to R—Notes on R: A Programming Environment for Data Analysis and Graphics*, http://cran.r-project.org/doc/manuals/R-intro.pdf, 2005.