STAT:5400 Midterm 1, 2016

<Your Name>

<date when you took exam>

1 LATEX

| Name	PDF
Gamma	$p(y\|\alpha, \beta) = \frac{\beta^\alpha}{\Gamma(\alpha)} y^{\alpha-1} exp(-\beta y)$

Table 1: A univariate continuous density

Table 1 is an excerpt from Cowles (2013).

2 R

1. Read the data from the `data.txt` file in the Datasets section of the course web page into a dataframe in R. You may either save the file to disk and read it from there or read it directly from the web site. Then calculate summary statistics of each column and produce the scatterplot. Both outputs are shown below.

```
       x                  y
 Min.   :-2.67300   Min.   :0.538
 1st Qu.:-0.58750   1st Qu.:1.098
 Median : 0.09450   Median :1.504
 Mean   : 0.02628   Mean   :1.702
 3rd Qu.: 0.62525   3rd Qu.:2.061
 Max.   : 2.52000   Max.   :6.676
```
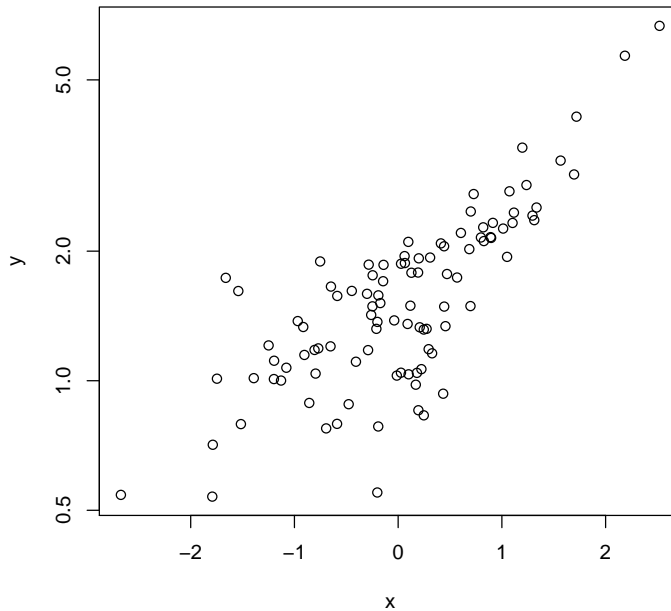
2. The volume of a rectangular solid with length l, width w, and height h is lwh.

   (a) Write an R function to calculate the volume of a rectangular solid. It should accept a single argument – a vector of length 3 containing the length, width, and height. It should check for valid input before performing the calculation. Include the R code that defines your function.

   (b) Create a matrix in R with the following entries:

```
16.5  12.8  4.2
 3.1   2.7  8.5
```

     Consider the first column as lengths, the second column as widths, and the third column as heights. Write efficient R code to compute the volumes of rectangular solids with dimensions in each row of the matrix. Include your R code and its output.

References

Cowles, M. K. (2013). *Applied Bayesian Statistics*. Springer.