Problem 2: Probability Distributions

Assigned: 12 October
Due: 28 October
Maximum Mark: 10 Points
Maximum Submission Length: 4 pages

1. Determine (analytically) the complete equations describing the cumulative distribution function for each of the following four probability density functions.

PDF1(x) = 1 (if -1/2 ≤ x ≤ 1/2)
0 (otherwise)

PDF2(x) = e^{-x} (if $x \geq 0$)
0 (otherwise)

PDF3(x) = $\frac{1}{\sqrt{\pi}} e^{-x^2}$

PDF4(x) = x^{-2} (if $x \geq 1$)
0 (otherwise)

Note: You can implement equations nicely in Rmarkdown using LaTeX code, or you can edit in your equations using MS Word after knitting to .docx format. You do not have to include your mathematical derivations, although you may submit handwritten work as a supplementary attachment for feedback if you wish.

2. Make line plots of all eight functions (four PDFs and four CDFs) in R. Make sure to specify the range along the x-axis appropriate for each plot to ensure that the curves are not excessively truncated and the form of the function is clear. Plot the functions side-by-side in your report (such that each PDF is on the left of each CDF).

3. Determine the median, first and third quartiles, and interquartile range of each PDF using your CDFs to complete the following table. (Give precise values: if expressing as a decimal and the decimal expression is not exact, include at least four significant figures.)

	Median	Q1	Q3	IQR
PDF1				
PDF2				
PDF3				
PDF4				