MATH 255 Homework 4

(Due 27 November 2023)

1. **Go to www.random.org .**
2. **Generate true random numbers uniformly distributed in the interval [0,1].**
3. **Input 2000 of these numbers to your computer; print first 50 of them**
4. **Write a computer program to convert these uniformly distributed random numbers to a random numbers from the following probability densitiy functions; provide the analytic procedure for the conversion.**
    - 4.1. **Exponentially distributed with λ=2; store all 2000 numbers in a file; print first 50 of them.**
    - 4.2. **The pdf is as given in the Figure below; 2000 numbers in a file; print first 50 of them.**
    - 4.3. **Two-sided exponentially distributed with λ=2 (the pdf for this distribution is given below); print first 50 of them.**
5. **Make histograms of 2000 random numbers in 3, 4.1, 4.2 and 4.3. Use 20 slots; do they look like "uniform", "exponential" and "triangular" distrbuted random numbers.**
6. **Estimate the mean and variance of the random numbers in 3, 4.1, 4.2 and 4.3. (This is a numerical estimation from the 2000 long numerical arrays. You may use any procedure, including any available facility in your programming environment; but you must indicate the exact formula that is used.)**

For 4.2 — figure of $f_{\underline{X}}(x)$ showing two triangular pulses peaking at $\frac{1}{2}$, the first over $[1,3]$ and the second over $[4,6]$ on the x-axis.

$$f_{\underline{X}}(x) = \frac{\lambda}{2} e^{-\lambda |x|}$$

for bi-exponential