MATH95003 – COURSE PROJECT 2

1. Derive a recurrence relation for the p^{th} derivative of Chebyshev polynomials $T_n^{(p)}(x_j)$ evaluated at the Gauss-Lobatto points $x_j = \cos(j\pi/n)$ for $j = 0, \ldots, n$.

2. Use the result from question 1 to solve the boundary value problem

$$y''(x) - xy(x) = 0 \qquad -40 \leq x \leq 40 \qquad y(40) = 0, \quad y'(-40) = 1$$

   for $y(x)$ using an expansion of $y(x)$ in Chebyshev polynomials.

Write a brief summary of your solution, including figures (for question 2) and your well-commented code. Upload your writeup to blackboard (Grade Centre).

Deadline for submission: 13. March 2020 at 17:00.