MATH 212: Homework 7

Due Thursday, Nov 29

Numbered problems are from *Numerical Analysis* by L. Ridgway Scott. Other problems are from *An Introduction to Numerical Analysis* by Süli and Mayers (this is just for proper credit, you shouldn't need to reference that book).

Problem 1. Chapter 10: 7, 11

Problem 2. Chapter 11: 4,7,17

Problem 3. Let $n \geq 1$ and consider equally spaced points on $[-1, 1]$

$$x_j = \frac{2j - n}{n},\ j = 0, \ldots, n.$$

Call as usual $\omega_n(x) = (x - x_0) \cdots (x - x_n)$ and show that $\omega(1 - 1/n) = -\frac{(2n)!}{2^n n^{n+1} n!}$. Using Sterling's formula

$$N! \sim \sqrt{2\pi N} N^N e^{-N} \quad \text{as} \quad N \to \infty$$

show that

$$\omega_n(1 - 1/n) \sim -\frac{2^{n+1/2} e^{-n}}{n}$$

for large n.