

M 384: Assignment 6

Nathan Stouffer

Exercises 7.5.5 — Problem 7

Problem. If f is C^1 on $[a, b]$ prove that there exists a cubic polynomial P such that $f - P$ and its first derivative vanish at the endpoints of the interval.

Proof.

□

Exercises 7.5.5 — Problem 9

Problem. If $f(c) = 0$ for some point c in (a, b) , prove that the polynomials approximating f on $[a, b]$ may be taken to vanish at c .

Proof.

□

Exercises 7.5.5 — Problem 14

Problem.

- a. For $c_m = \int_{-1}^1 (1 - x^2)^m dx$, obtain the identity $c_m = c_{m-1} - (1/2m)c_m$ by integration by parts.
- b. Show that

$$c_m = 2 \frac{2 * 4 * 6 * \cdots * (2m)}{3 * 5 * 7 * \cdots * (2m+1)} = \frac{2(2^m m!)^2}{(2m+1)!}$$

Proof.

□