

## Extra Credit Assignment 9

Due Friday, October 22, 11:59 PM

Consider the following polynomials:

- $P_0(x) = 1$
- $P_1(x) = x$
- $P_2(x) = \frac{1}{2}(3x^2 - 1)$
- $P_3(x) = \frac{1}{2}(5x^3 - 3x)$

For every pair of numbers  $i$  and  $j$  between 0 and 3 (inclusive), and assuming  $i \neq j$ , compute

$$\int_{-1}^1 P_i(x)P_j(x) dx.$$

You probably noticed a pattern. Can you find another polynomial  $P_4(x)$ , of degree 4, so that this pattern holds?