## Homework Assignment 11 <br> Due on Friday 12/20

## Programming Problems:

1. Write a Matlab code that performs composite Gaussian quadrature rule with 2 points or 3 points to approximate $\int_{a}^{b} f(x) d x$. Your code should take $f, a, b$ and $n$ as input data, where $n$ is the number of the subintervals, i.e. $h=\frac{b-a}{n}$.

## Writing Problems:

Do the following exercise problems in the text book by Bradie,
Sec 6.6: 1(c), 2*, $4^{*}, 5^{*}, 11^{*}, 21^{*}, 28,31^{*}, 32^{*}$
Just turn in problems with *.
Bonus Problems:(Add one point in the final grade.) Let $P_{n}(x)$ be a family of orthogonal polynomials with respect to the weight function $w(x)$, that is, $\operatorname{deg}\left(P_{n}(x)\right)=n$ and $\int P_{n}(x) P_{m}(x) w(x) d x=0$ for $m \neq n$. Prove that there exists numbers $a_{n}, b_{n}, c_{n}$ such that

$$
P_{n+1}(x)=\left(a_{n} x+b_{n}\right) P_{n}(x)+c_{n} P_{n-1}(x)
$$

