

Use of Symbolic MATLAB for Two Problems

Midterm Exam Problem 2:

Define:

```
function y = weight_inner_prod (u, v)
syms x;
y = int(sqrt(x)*u*v, 0, 1);
end
```

then the code:

```
syms x;
g = [sym(1), x^2, x^4, x^6];
fhandle = @weight_inner_prod;
gbar = GramSchmidtSymbolic (g, fhandle)
```

determines the orthogonal basis.

Gaussian Quadrature Problem 1:

Define:

```
function y = prob1_inner_prod (u, v)
syms x;
y = int(sqrt(x)*u*v, 0, 1);
end
```

then the code:

```
syms x;
g = [sym(1), x, x^2, x^3, x^4, x^5];
fhandle = @prob1_inner_prod;
gbar = GramSchmidtSymbolic (g, fhandle)
```

determines the orthogonal basis.

```
function gbar = GramSchmidtSymbolic (g, innerproduct)
%
syms x
n = length (g);
%
gbar = g;
for i = 1:n
    for j = 1:i-1
        gbar(i) = gbar(i)-innerproduct(gbar(i), gbar(j))*gbar(j);
    end
    gbar(i) = gbar(i)/sqrt(innerproduct(gbar(i), gbar(i)));
end
end
```