Legendre functions have an important property that is, they are orthogonal on the interval $-1 \le x \le 1$:

$$\int_{-1}^{1} P_m(x) P_n(x)\,dx = \frac{2}{2n+1}\delta_{mn}$$

(where δ_{mn} denotes the *Kronecker delta*, equal to 1 if $m = n$ and to 0 otherwise).

We can verify this result using Scilab.

To work with Legendre Polynomials we use the Scilab function *legendre(n,m,x)*.

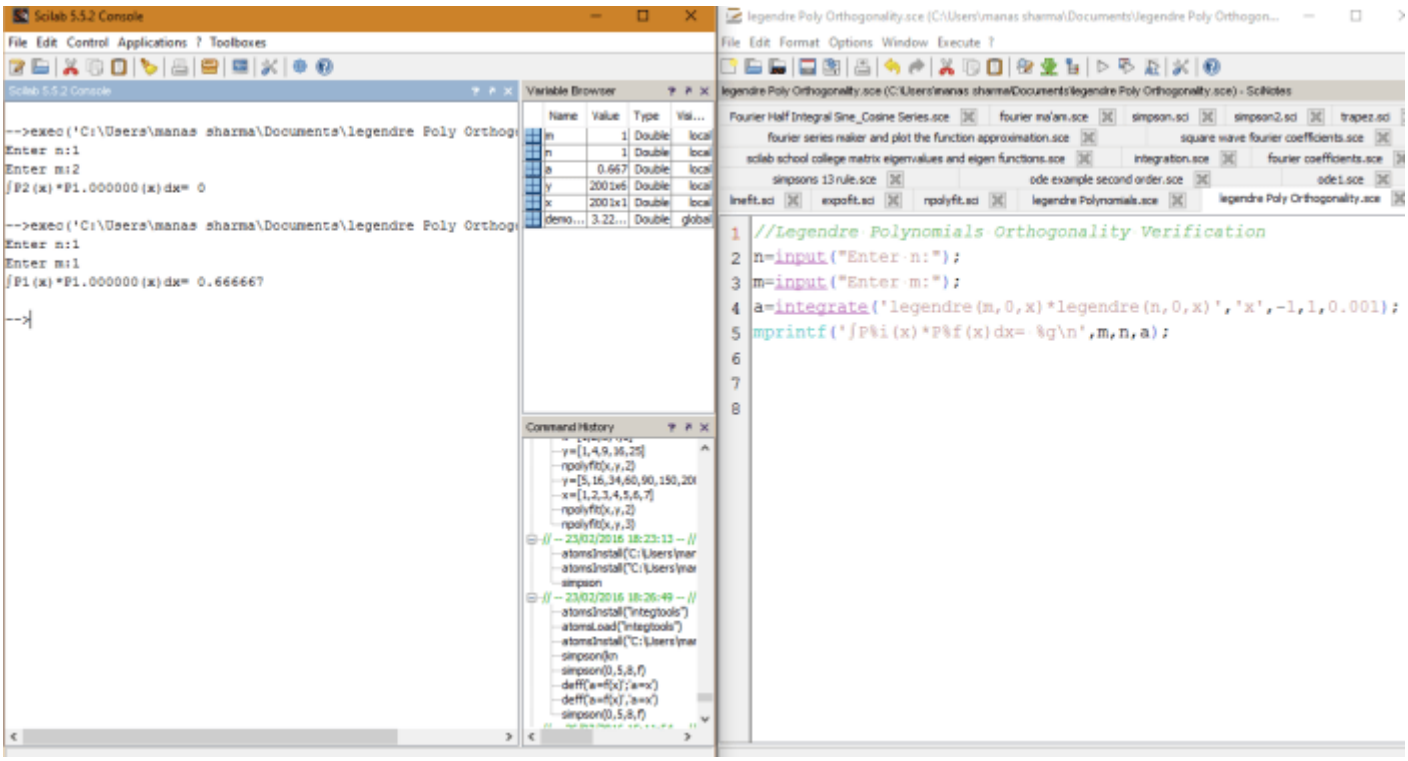
Which basically returns the value of the Associated Legendre Polynomial for a given value of m,n and x.
However, since I only wanted Legendre Polynomials so I'll have to put m=0.

The following code returns the value of the integral, ∫Pm(x)*Pn(x)dx,

```
//Legendre Polynomials Orthogonality Verification
clc;
n=input("Enter n:");
m=input("Enter m:");
a=integrate('legendre(m,0,x)*legendre(n,0,x)','x',-1,1,0.001);
mprintf('∫P%i(x)*P%f(x)dx= %g\n',m,n,a);
```

Output:
Enter n:1
Enter m:1
∫P1(x)*P1.000000(x)dx= 0.666667

Enter n:5
Enter m:2
∫P2(x)*P5.000000(x)dx= 0



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