

1 Some numerical examples with polygauss.m and polygaussj.m .

In this section we show some examples about using polygauss.m and on some different domains. We use the two different routines, for computing

$$\int_{\Omega} \exp(-100((x-0.5)^2 + (y-0.5)^2)) dx dy$$

where Ω is the polygon whose vertices are

```
[0.1 0; 0.7 0.2; 1 0.5; 0.75 0.85; 0.5 1; 0 0.25];
```

The results on a Centrino Duo T2400 with Windows XP and Matlab 6.1.0.450 are

```
>> demo_gausscub
```

```
[GAUSS LIKE FORMULA FOR POLYGONS][VERS. 4.0][MARCH 7, 2006]
```

```
[POLYGON]: CONVEX POLYGON
```

```
-----  
[ROTATION]: AUTOMATIC [ANGLE CLOCKWISE (RESPECT Y, IN DEGREES)]: 158.19859
```

```
-----  
[SIDES ]: 6 [CUBATURE TYPE]: 4 [DEGREE ]: 10 [PTS]: 660
```

```
[DOMAIN ]: 2 [FUNCTION ]: 5 [CPUTIME]: 1.50e-002
```

```
[PGAUSS RESULT ]: 0.031413836611538
```

```
[EXACT RESULT ]: 0.031414528632393
```

```
[ABSOLUTE ERROR]: 6.920208546687401e-007
```

```
[RELATIVE ERROR]: 2.202868815148048e-005
```

```
>> demo_gausscubj
```

```
[MODIFIED GAUSS-JACOBI LIKE FORMULA FOR POLYGONS][VERS. 4.0] [MARCH 7, 2007]
```

```
[POLYGON]: CONVEX POLYGON
```

```
-----  
[ROTATION]: AUTOMATIC [ANGLE CLOCKWISE (RESPECT Y, IN DEGREES)]: 158.19859
```

```
-----  
[SIDES ]: 6 [CUBATURE TYPE]: 4 [DEGREE ]: 10 [PTS]: 600
```

```
[DOMAIN ]: 2 [FUNCTION ]: 5 [CPUTIME]: 3.20e-002
```

```
[PGAUSSJ RESULT]: 0.031412885345027
```

```
[EXACT RESULT ]: 0.031414528632393
```

```
[ABSOLUTE ERROR]: 1.643287366105695e-006
```

```
[RELATIVE ERROR]: 5.230978905764078e-005
```

```
>>
```

We made the same experiments on GNU Octave, version 2.1.73 (i686-pc-cygwin), obtaining

```
octave:1> demo_gausscub
```

```
[GAUSS LIKE FORMULA FOR POLYGONS] [VERS. 4.0] [MARCH 7, 2006]

[POLYGON]: CONVEX POLYGON
-----
[ROTATION]: AUTOMATIC [ANGLE CLOCKWISE (RESPECT Y, IN DEGREES)]: 158.19859
-----
[SIDES   ]: 6 [CUBATURE TYPE]: 4 [DEGREE ]: 10 [PTS]: 660
[DOMAIN  ]: 2 [FUNCTION      ]: 5 [CPUTIME]: 4.38e-01
[PGAUSS RESULT ]: 0.031413836611538
[EXACT RESULT  ]: 0.031414528632393
[ABSOLUTE ERROR]: 6.920208546409845e-07
[RELATIVE ERROR]: 2.202868815059695e-05
-----
```

```
octave:2> demo_gausscubj
```

```
[MODIFIED GAUSS-JACOBI LIKE FORMULA FOR POLYGONS] [VERS. 4.0] [MARCH 7, 2007]

[POLYGON]: CONVEX POLYGON
-----
[ROTATION]: AUTOMATIC [ANGLE CLOCKWISE (RESPECT Y, IN DEGREES)]: 158.19859
-----
[SIDES   ]: 6 [CUBATURE TYPE]: 4 [DEGREE ]: 10 [PTS]: 600
[DOMAIN  ]: 2 [FUNCTION      ]: 5 [CPUTIME]: 5.15e-01
[PGAUSSJ RESULT]: 0.031412885345027
[EXACT RESULT  ]: 0.031414528632393
[ABSOLUTE ERROR]: 1.643287366112633e-06
[RELATIVE ERROR]: 5.230978905786166e-05
-----
```

```
octave:3>
```

The files in the current version 4.0 of the package are

```
define_polygon.m
demo_gausscub.m
demo_gausscubj.m
exact_integrals.m
fct2D.m
polygauss.m
polygaussj.m
```

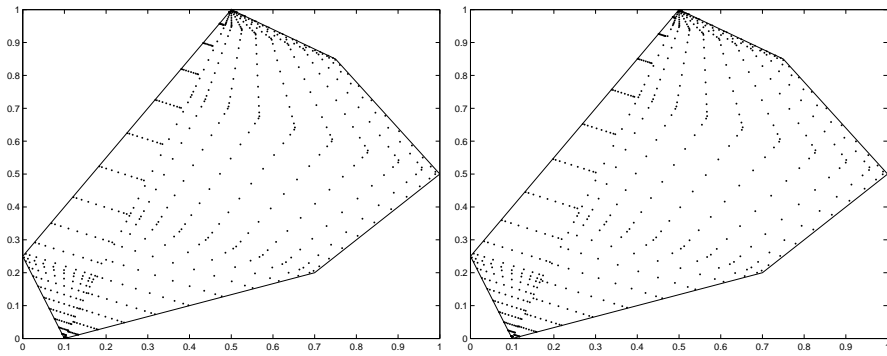


Figure 1: The domain Ω with Gauss-Legendre and Gauss-Jacobi like points (respectively).