

```

1: Program Aula07do01exerc2
2: COMMON/xm/xmax
3: COMMON/NN/N
4: Real xmax, PI, s, xmin
5: parameter (PI = 3.1415926)
6: open(13, file="Aula07do01exerc02.txt")
7: N = 300
8: xmax = 9
9: xmin = 0
10: call int3d(xmin, xmax, s)
11: exata = (729/4.0)
12: error = ABS(exata - s)/exata*100
13: write(13, *) "Integral de r^2 sobre um volume esferico"
14: write(13, *) "Raio:", xmax
15: write(13, *) "Valor exato:", exata
16: write(13, *) "Valor numerico:", s
17: write(13, *) "Erro percentual:", error, "%"
18: end program
19:
20: Subroutine int3d(x1,x2,ss)
21: real ss,x1,x2,h
22: external h
23: call qtrapz(h,x1,x2,ss)
24: return
25: end
26:
27: Subroutine qtrapz(func,A,B,SS)
28: Real SS, func, soma
29: COMMON/NN/N
30: External func
31: h = (B-A)/N
32: soma = 0.0
33: do i = 1, N-1
34: soma = soma + func(A+i*h)
35: enddo
36: SS = h/2.0 * (func(A) + 2.0*soma + func(B))
37: return
38: end
39:
40: real function z1(x,y)
41: COMMON/xm/xmax
42: real x, y
43: z1 = 0
44: end
45:
46: real function z2(x,y)
47: COMMON/xm/xmax
48: real x, y
49: z2 = sqrt(ABS(x**2 - 9.0*y**2))
50: end
51:
52: real function y1(x)
53: COMMON/xm/xmax
54: real x
55: y1 = 0
56: end
57:
58: real function y2(x)
59: COMMON/xm/xmax
60: real x
61: y2 = x/3.0
62: end
63:
64: function h(xx)
65: real h, xx, g, y1, y2, ss
66: external g
67: COMMON/xr/xmin,xmax
68: COMMON/xyz/x,y,z
69: x = xx
70: call qtrapz(g, y1(x), y2(x), ss)
71: h = ss
72: return

```

```
73: end
74:
75: function g(yy)
76: real g, yy, f, z1, z2, x, y, ss
77: external f
78: COMMON/xr/xmin,xmax
79: COMMON/xyz/x,y,z
80: y = yy
81: call qtrapz(f, z1(x,y), z2(x,y), ss)
82: g = ss
83: return
84: end
85:
86: function f(zz)
87: real f, zz, x, y, z
88: COMMON/xyz/x,y,z
89: z = zz
90: f = func(z)
91: return
92: end
93:
94: real function func(z)
95: real z
96: func = z
97: return
98: end
99:
100:
101:
102:
103:
104:
105:
106:
107:
108:
109:
```