```fortran
 1: Program Aula16do01exerc1
 2: COMMON/xm/xmax
 3: COMMON/NN/N
 4: Real xmax, PI, s, xmin
 5: parameter (PI = acos(-1.0))
 6: open(13, file="Aula16do01exerc11.txt")
 7: N = 1000
 8: xmax = 2
 9: xmin = 0
10: call int3d(xmin, xmax, s)
11: write(13, *)"Integral Dupla Numeria de x^2 + 4y^2"
12: write(13, *)"Raio:", xmax
13: write(13, *)"Valor numerico:", s
14: exata = PI
15: error = ABS(exata - s)/exata*100
16: write(13, *)"Valor exato:", exata
17: write(13, *)"Erro percentual:", error, "%"
18: write(13, *)"Reparticoes (N):", N
19: end program
20:
21: Subroutine int3d(x1,x2,ss)
22: real ss,x1,x2,h
23: external h
24: call qtrapz(h,x1,x2,ss)
25: return
26: end
27:
28: Subroutine qtrapz(func,A,B,SS)
29: Real SS, func, soma
30: COMMON/NN/N
31: External func
32: h = (B-A)/N
33: soma = 0.0
34: do i = 1, N-1
35: soma = soma + func(A+i*h)
36: enddo
37: SS = h/2.0 * (func(A) + 2.0*soma + func(B))
38: return
39: end
40:
41: real function y1(x)
42: COMMON/xm/xmax
43: real x
44: y1 = 0
45: end
46:
47: real function y2(x)
48: COMMON/xm/xmax
49: real x
50: y2 = sqrt(4-x**2)/2.0
51: end
52:
53: function h(xx)
54: real h, xx, f, y1, y2, ss
55: external f
56: COMMON/xrange/xmin,xmax
57: COMMON/xyz/x,y,z
58: x = xx
59: call qtrapz(f, y1(x), y2(x), ss)
60: h = ss
61: return
62: end
63:
64: function f(yy)
65: real f, yy, x, y
66: COMMON/xyz/x,y,z
67: y = yy
68: f = func(x,y)
69: return
70: end
71:
72: real function func(x,y)
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73: real x,y
74: func = x**2 + 4*y**2
75: return
76: end
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