```fortran
 1: Program Aula09do01exerc01
 2: COMMON/xm/xmax
 3: COMMON/NN/N
 4: Real xmax, PI, s, xmin
 5: parameter (PI = 3.1415926)
 6: open(13, file="Aula09do01exerc01.txt")
 7: N = 300
 8: xmax = PI/2
 9: xmin = 0
10: call int3d(xmin, xmax, s)
11: write(13, *)"Integral de r^3 sobre um volume esferico"
12: write(13, *)"Raio:", xmax
13: write(13, *)"Valor numerico:", s
14:
15: exata = (8*PI)
16: error = ABS(exata - s)/exata*100
17: write(13, *)"Valor exato:", exata
18: write(13, *)"Erro percentual:", error, "%"
19: write(13, *)"Repartições (N):", N
20: end program
21:
22: Subroutine int3d(x1,x2,ss)
23: real ss,x1,x2,h
24: external h
25: call qtrapz(h,x1,x2,ss)
26: return
27: end
28:
29: Subroutine qtrapz(func,A,B,SS)
30: Real SS, func, soma
31: COMMON/NN/N
32: External func
33: h = (B-A)/N
34: soma = 0.0
35: do i = 1, N-1
36: soma = soma + func(A+i*h)
37: enddo
38: SS = h/2.0 * (func(A) + 2.0*soma + func(B))
39: return
40: end
41:
42: real function z1(x,y)
43: COMMON/xm/xmax
44: real x, y
45: z1 =   0
46: end
47:
48: real function z2(x,y)
49: COMMON/xm/xmax
50: real x, y
51: z2 = 4
52: end
53:
54: real function y1(x)
55: COMMON/xm/xmax
56: real x
57: y1 = 0
58: end
59:
60: real function y2(x)
61: COMMON/xm/xmax
62: real x
63: y2 = 2
64: end
65:
66: function h(xx)
67: real h, xx, g, y1, y2, ss
68: external g
69: COMMON/xrange/xmin,xmax
70: COMMON/xyz/x,y,z
71: x = xx
72: call qtrapz(g, y1(x), y2(x), ss)
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 73: h = ss
 74: return
 75: end
 76:
 77: function g(yy)
 78: real g, yy, f, z1, z2, x, y, ss
 79: external f
 80: COMMON/xrange/xmin,xmax
 81: COMMON/xyz/x,y,z
 82: y = yy
 83: call qtrapz(f, z1(x,y), z2(x,y), ss)
 84: g = ss
 85: return
 86: end
 87:
 88: function f(zz)
 89: real f, zz, x, y, z
 90: COMMON/xyz/x,y,z
 91: z = zz
 92: f = func(y)
 93: return
 94: end
 95:
 96: real function func(y)
 97: real y
 98: func = y**3
 99: return
100: end
```