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 1: Program Aula23do01exerc3
 2: COMMON/xm/xmax
 3: COMMON/NN/N
 4: Real xmin, xmax, PI, s1, s2
 5: parameter (PI = acos(-1.0))
 6: dimension ICLOCK(3)
 7: open(13, file="Aula23do01exerc3.txt")
 8: call itime(ICLOCK)
 9: write(13,*)"hora final",ICLOCK(1),ICLOCK(2),ICLOCK(3)
10: N = 1000
11: if(MOD(N,2) .NE. 0) N = N+1
12: xmax = 2.0
13: xmin = 0
14: call int2DSimpson(xmin, xmax, S1)
15: call int2DTrapz(xmin, xmax, S2)
16: EXATA = PI
17: ERROR1 = ABS(EXATA - S1)/EXATA*100
18: ERROR2 = ABS(EXATA - S2)/EXATA*100
19: write(13, *)"Integral Dupla de X^2 + 4Y^2"
20: Write(13,*)"Valor numerico pela Integral de Simpson:", S1
21: Write(13,*)"Valor Exato:", EXATA
22: Write(13,*)"ERRO RELATIVO", ERROR1, "%"
23: write(13,*)"Reparticoes (N):", N
24: write(13,*)"-------------------------------------------------"
25: Write(13,*)"Valor numerico pela Integral Trapezio:",S2
26: Write(13,*)"Valor Exato:", EXATA
27: Write(13,*)"ERRO RELATIVO", ERROR2, "%"
28: write(13,*)"Reparticoes (N):", N
29: call itime(ICLOCK)
30: write(13,*)"hora final",ICLOCK(1),ICLOCK(2),ICLOCK(3)
31: end program
32:
33: Subroutine int2DSimpson(x1,x2,S1)
34: real ss,x1,x2,h
35: external h
36: call simpson(h,x1,x2,S1)
37: return
38: end
39:
40: Subroutine int2DTrapz(x1,x2,S2)
41: real ss,x1,x2,g
42: external g
43: call trapz(g,x1,x2,S2)
44: return
45: end
46:
47: subroutine simpson(func, a, b, S1)
48: COMMON / NN / N
49: h = (b-a)/N
50: soma = func(a)
51: fator = 2
52: do i = 1, N-1
53:     if (fator == 2.) then
54:         fator = 4
55:     else
56:         fator = 2
57:     end if
58:     x = a+i*h
59:     soma = soma + fator*func(x)
60: enddo
61: soma = soma + func(b)
62: S1 = soma * h/3
63: end
64:
65: Subroutine trapz(func,a,b,S2)
66: Real SS, func, soma
67: COMMON/NN/N
68: External func
69: h = (b-a)/N
70: soma = 0.0
71: do i = 1, N-1
72: soma = soma + func(a+i*h)
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 73: enddo
 74: S2 = h/2.0 * (func(a) + 2.0*soma + func(b))
 75: return
 76: end
 77:
 78: real function y1(x)
 79: COMMON/xm/xmax
 80: real x
 81: y1 = 0
 82: end
 83:
 84: real function y2(x)
 85: COMMON/xm/xmax
 86: real x
 87: y2 = sqrt(4-x**2)/2.0
 88: end
 89:
 90: function h(xx)
 91: real h, xx, f, y1, y2, s1
 92: external f
 93: COMMON/xrange/xmin,xmax
 94: COMMON/xyz/x,y,z
 95: x = xx
 96: call simpson(f, y1(x), y2(x), s1)
 97: h = s1
 98: return
 99: end
100:
101: function g(xx)
102: real g, xx, f, y1, y2, s2
103: external f
104: COMMON/xrange/xmin,xmax
105: COMMON/xyz/x,y,z
106: x = xx
107: call trapz(f, y1(x), y2(x), s2)
108: g = s2
109: return
110: end
111:
112: function f(yy)
113: real f, yy, x, y
114: COMMON/xyz/x,y,z
115: y = yy
116: f = func(x,y)
117: return
118: end
119:
120: real function func(x,y)
121: real x,y
122: func = x**2 + 4*y**2
123: return
124: end
```