

```
1: Program Aula21do01exe02
2: External func
3: Real func
4: COMMON / h / h
5: COMMON / NN / N
6: open(13, file="Aula21do01exerc2.txt")
7: N = 10
8: if(MOD(N,2) .NE. 0) N = N+1
9: a = 2.0
10: b = 4.0
11: call simpson(func, a, b, SS)
12: call trapz(func, a, b, RR)
13: EXATA = 2.0*sin(8.0) - sin(4.0) + 236/3.0 + (cos(8.0) - cos(4.0))/4.0
14: ERROR1 = ABS(EXATA - SS)/EXATA*100
15: ERROR2 = ABS(EXATA - RR)/EXATA*100
16: write(13, *) "Integral de x^3 + x^2 + x*cos(2x)"
17: Write(13,*) "Valor Exato:", EXATA
18: Write(13,*) "Valor numerico pela Integral Trapezio:", RR
19: Write(13,*) "ERRO RELATIVO", ERROR2, "%"
20: write(13,*) "Reparticoes (N):", N
21: write(13,*) "-----"
22: Write(13,*) "Valor numerico pela Integral de Simpson:", SS
23: Write(13,*) "ERRO RELATIVO", ERROR1, "%"
24: write(13,*) "Reparticoes (N):", N
25: end program
26:
27: subroutine simpson(func, a, b, SS)
28: COMMON / h / h
29: COMMON / NN / N
30: H = (b-a)/N
31: soma = func(a)
32: fator = 2
33: do i = 1, N-1
34:     if (fator == 2.) then
35:         fator = 4
36:     else
37:         fator = 2
38:     end if
39:     x = a+i*h
40:     soma = soma + fator*func(x)
41: enddo
42: soma = soma + func(b)
43: SS = soma * h/3
44: end
45:
46: subroutine trapz(func, a, b, RR)
47: COMMON / h / h
48: COMMON / NN / N
49: h = (b-a)/N
50: soma = 0.0
51: do i = 1, N-1
52:     soma = soma + func(a+i*h)
53: enddo
54: RR = h/2.0 * (func(a) + 2.0*soma + func(b))
55: return
56: end
57:
58: real function func(x)
59: func = x**3 + x**2 + x*cos(2.0*x)
60: return
61: end
62:
63:
64:
65:
66:
```