W2-3-4 The total differential of a function with two variables 4

Consider a cyclical process through the points (x, z): $(1,1) \rightarrow (1,4) \rightarrow (3,4) \rightarrow (3,1) \rightarrow (1,1)$. Calculate the cyclic integral around this path assuming the total differential $\mathrm{d}y = 2ax\mathbf{d}x + 2bz\mathbf{d}z$.

The contour integral is: $\oint \mathrm{d}y = \oint(2ax\mathrm{d}x + 2bz\mathrm{d}z) = \oint 2ax\mathrm{d}x + \oint 2bz\mathrm{d}z =$
$\int_1^1 2ax\mathrm{d}x + \int_1^3 2ax\mathrm{d}x + \int_3^1 2ax\mathrm{d}x + \int_1^4 2bz\mathrm{d}z + \int_4^4 2bz\mathrm{d}z + \int_4^1 2bz\mathrm{d}z + \int_1^1 2bz\mathrm{d}z =$
$0 + \int_1^3 2ax\mathrm{d}x + 0 - \int_1^3 2ax\mathrm{d}x + \int_1^4 2bz\mathrm{d}z + 0 - \int_1^4 2bz\mathrm{d}z + 0 = 0$. This is the expected answer, because y is a total differential.