Integral Aufgabe 243

Berechnen Sie den Flächeninhalt A, der von $f_{(x)} = (x^2 - 2x) * e^x$ und der x-Achse begrenzt wird.

Nullstellen:

$(x^2 - 2x) * e^x = 0$

$e^x * x(x - 2) = 0$

$e^x * x = 0 \; |:e^x$

$x_1 = 0$

$x - 2 = 0 \; |+2$

$x_2 = 2$

$A = \int_0^2 ((x^2 - 2x)e^x)dx$

Integration durch Substitution:

$u = x^2 - 2x, \; u' = 2x - 2, \; u'' = 2$

$v = e^x, \; v' = e^x$

$\int \left((x^2 - 2x)e^x\right) dx = (x^2 - 2x)e^x - \int ((2x - 2)e^x)dx$

$\int \left((x^2 - 2x)e^x\right) dx = (x^2 - 2x)e^x - [(2x - 2)e^x - \int 2e^x)dx]$

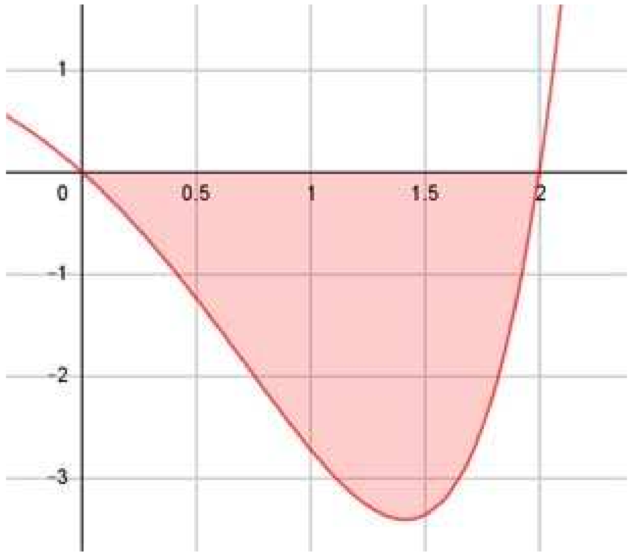
$\int \left((x^2 - 2x)e^x\right) dx = (x^2 - 2x)e^x - [(2x - 2)e^x - 2e^x]$

$\int \left((x^2 - 2x)e^x\right) dx = e^x[(x^2 - 2x - 2x + 2 + 2]$

$\int \left((x^2 - 2x)e^x\right) dx = e^x[(x^2 - 4x + 4]$

$A = \int_0^2 ((x^2 - 2x)e^x)dx = |e^x(x^2 - 4x + 4)| _0^2$

A = $|e^2 * 0 - 4| =$ **4**



1
0
0.5
1
1.5
2
−1
−2
−3