Integral Aufgabe 45

Berechnen Sie den Flächeninhalt A zwischen dem Graphen von $f_{(x)} = x * \sqrt{x + 9}$ und der x-Achse.

Nullstellen:

$x * \sqrt{x + 9} = 0 \qquad -9 \leq x < \infty$

$x_1 = 0$

$\sqrt{x + 9} = 0 \ |^2$

$x + 9 = 0 \ |-9$

$x_2 = -9$

Integration durch Substitution:

$u = x + 9 \dashrightarrow \sqrt{x + 9} = \sqrt{u}$

$$u' = 1 = \frac{du}{dx} \dashrightarrow dx = du$$

$u = x + 9 \ |-9$

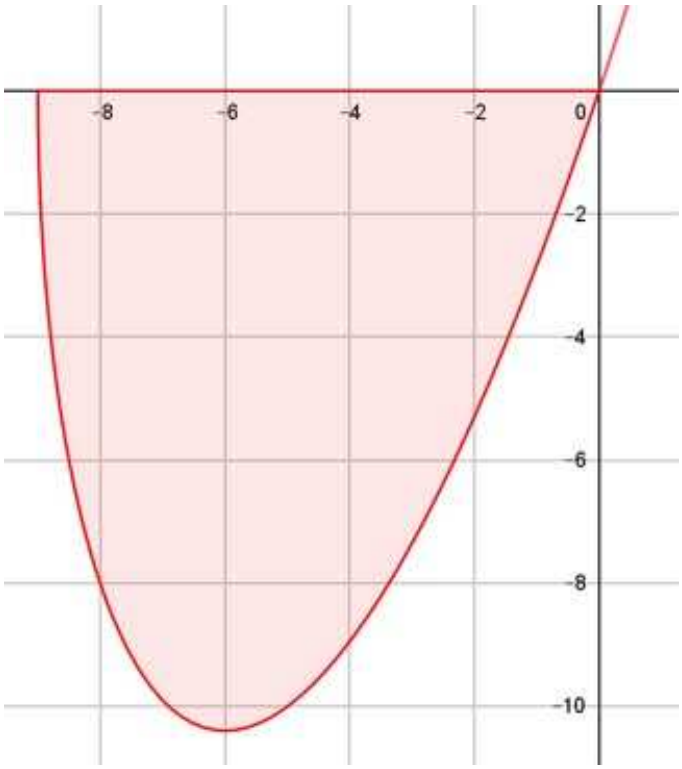
$x = u - 9$

$$\int x * \sqrt{x+9}\, dx = \int (u - 9) * \sqrt{u}\, du = \int (u^{\frac{3}{2}} - 9u^{\frac{1}{2}})\, du$$

$$A = \int_{-9}^{0} (u^{\frac{3}{2}} - 9u^{\frac{1}{2}})\, du = 2 * \left| \frac{u^{2,5}}{2,5} - 9 * \frac{u^{1,5}}{1,5} \right|_{-9}^{0} =$$

$$= \left| \frac{(x + 9)^{2,5}}{2,5} - 6 * (x + 9)^{1,5} \right|_{-9}^{0} = |-64,8 - 0|$$

A = 64,8


-8
-6
-4
-2
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