Area Under a Curve

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If $y = f(x)$ is nonnegative and integrable over a closed interval $[a, b]$, then the **area under the curve $y = f(x)$ from a to b** is given by Area = $\int_a^b (f(x))\,dx$. This region is bounded by the x-axis, and the vertical lines $x = a$, and $x = b$ and is always *positive*.

However, a definite integral of an integrable $f(x)$ can represent other fields (profit/loss, water comsumption, entrance/exit into a store) and can be a positive or negative value.

$\int_a^b (f(x))\,dx$ = (area above the x-axis) - (area below the x-axis)

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1. Set up a definite integral that yields the area of the region denoted by $f(x) = \sqrt{9 - x^2}$. Solve your integral.

2. In the graph to the right, the function f is defined for $-2 \le x \le 3$. What is the value of $\int_{-2}^{3} (f(x))\,dx$?