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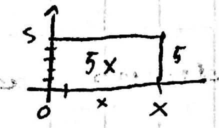
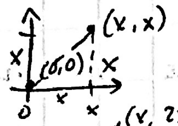
# Unit 7: The Anti-Derivative

$f(x) = \int_0^x 5\,dt$

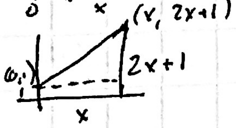



$g(x) = \int_0^x 3\,dt$ . . .

$h(x) = \int_0^x t\,dt$




$j(x) = \int_0^x 2t+1\,dt$




| function | area |
|---|---|
| $y = 5$ | $5x$ |
| $y = 3$ | $3x$ |
| $y = x$ | $\frac{1}{2}x^2$ |
| $y = 2x+1$ | $x^2 + x$ |

A function $F(x)$ is said to be the anti-derivative of $f(x)$ if and only if $F'(x) = f(x)$.

## The indefinite integral:

$$\underbrace{\int f(x)\,dx = F(x)}_{\text{notation for the antiderivative!}}$$

* No upper & lower limits

The integral of a power

$$\text{“}\int x^n\,dx = \text{”}\ \frac{1}{n+1}x^{n+1} + C \qquad \boxed{\frac{1}{n+1}x^{n+1}}$$

→ "$x^n$ is the derivative of what?"

1. add 1 to the exponent
2. divide down ↑

eg. $\int 5x\,dx = \frac{5}{2}x^2 + C$

$\int x^2+5x+6\,dx = \frac{1}{3}x^3 + \frac{5}{2}x^2 + 6x + C$