Math 187: Section 25.1: Antiderivatives

Wednesday, January 02, 2013
10:33 AM

what's the derivative $f'(x)$ for $f(x) = \frac{1}{3}x^3$?

$$f'(x) = x^2$$

so, reversing this process,

if function is now $f(x) = x^2$

the antiderivative $F(x) = \frac{1}{3}x^3$

note: if $f(x) = x^2$,

couldn't $F(x) = \frac{1}{3}x^3 + 2$ instead?

$= \frac{1}{3}x^3 - 5$

yes!

so $F(x) = \frac{x^3}{3} +$ constant, really.

but you'll find in our notation later that a lot of the time we write $F(x)$ as the <u>functional dependence</u> (how it depends on x) and only worry about the constant elsewhere

examples:

find $F(x)$ for:

$f(x) = x^5$ $\quad F(x) = \frac{1}{6}x^6$

$f(x) = x^2 + 2$ $\quad F(x) = \frac{1}{3}x^3 + 2x$

$f(x) = \cos x$ $\quad F(x) = \sin x$

$f(x) = e^x$ $\quad F(x) = e^x$

note: is $\frac{1}{3}(x+1)^3$ the antiderivative of $(x+1)^2$?

yes!

is $\frac{1}{3}(2x+1)^3$ the antiderivative of $(2x+1)^2$?

no! off by a factor of 2

is $\frac{1}{3}(x^2+1)^3$ the antiderivative of $(x^2+1)^2$?

really no!

wrong coeff $\not\equiv$ missing factor of x