Warm-up

- Definition of antiderivative of $f(x)$?
- What is an anti derivative of x^n?
- What is another antiderivative of x^n?

Warm-up

- Let f be a continuous function.
  Find an antiderivative of f.

Chain rule

Compute Let $F(x)=\int_0^{x^2} \sin(u^5)\,du$. find $F'(x)$.

Application of FTC-1

Sketch the graph of $\int_0^x \frac{t^3+1}{t^2+1}\,dt$

Application of FTC-1

Sketch the graph of $\int_0^x -2te^{-t^2}\,dt$

Fundamental theorem of calculus part 2.

Let f be a continuous function and

Let $F'(x) = f(x)$.

Then $\int_a^b f(x)\,dx = F(b) - F(a)$.

Q: $\int_0^{\pi/a} \sin ax\,dx = ?$

Q: Given a rod of length 3m and density of $\delta(x) = (2x^2+1)$ g/m find the mass of the rod.

Alternate proof of FTC-2.

Important integrals

See thm 1.3.16 in CLP-2 book.

$f(x)$	$F(x)$ (anti derivative)
1	$x + C$
x^n	$\frac{x^{n+1}}{n+1} + C$, $n \neq -1$
$\frac{1}{x}$	$\ln\|x\| + C$
e^x	$e^x + C$
$\vdots$	$\vdots$

Indefinite integrals.

$$\int_a^b f(x)\,dx \qquad \text{vs.} \qquad \int f(x)\,dx.$$

Net change theorem

- If f is continuous on $[a, b]$
- and F is any antiderivative of f, then

$$\int_a^b f(x)\,dx = F(b) - F(a)$$

Approximate sum.

Consider $f(x) = x(50-x)$

(8) Find the total lenght of support beams.