today:

§ 5.5 - u substitution
webwork 0 due @ 11:55 pm

friday:

mslc: webwork 1 workshop @ 11:30, 12:30, 1:30, 2:30, 3:30 in SE 040
webwork 1 due @ 11:55 pm

tuesday, oct 6:

homework 1 due (5.1.14, 5.2.6, 5.2.24, 5.3.29, 5.3.54, 5.4.26)
§ 5.6 - logarithms
§ 6.1 - area between curves

thursday, oct 8:

review for midterm

friday, oct 9:

mslc: webwork 2 workshop @ 11:30, 12:30, 1:30, 2:30, 3:30 in SE 040
webwork 2 due @ 11:55 pm

sunday, oct 11:

mslc: midterm review 7:30 pm - 9:18 pm in HI 131

last time...

we considered the cumulative area function

$$g(x) = \int_0^x f(t)\mathrm{d}t$$

and learned how to take its derivative via the first fundamental theorem of calculus:

$$g'(x) = f(x)$$

last time...

derivatives of more complicated functions with integrals can be taken by using the second fundamental theorem.

ex: Find $g'(0)$ when

$$g(x) = \int_x^{x^2} \sqrt{1+t}\,\mathrm{d}t$$

g'(0)=-1

last time...

the real power of the second fundamental theorem is that it lets us evaluate definite integrals using antiderivatives instead of as limits of sums.

ex: Find

$$\int_0^1 \left(1 + x^2 + \frac{1}{1+x^2}\right) \mathrm{d}x$$

pi/4 + 4/3

differentials

suppose $y = f(x)$. Then since $\mathrm{d}y/\mathrm{d}x = f'(x)$, the differential $\mathrm{d}y$ is defined as

$$\mathrm{d}y = f'(x)\mathrm{d}x$$

We used differentials in 151.xx to approximate function values using the rule

$$f\left(a + \mathrm{d}x\right) \approx f(a) + \mathrm{d}y$$

See § 3.11 for more.

chain rule

make sure everyone remembers notation for composition of functions

Practice a couple

Let f and g be functions. Suppose f is differentiable at $g(x)$ and g is differentiable at x. Then

$$\frac{\mathrm{d}}{\mathrm{d}x}\left(f \circ g\right)(x) = f'(g(x))\, g'(x)$$

or as differentials,

$$\mathrm{d}\left(f \circ g\right)(x) = f'(g(x))\, g'(x)\, \mathrm{d}x = f'(g)\, \mathrm{d}g$$

u substitution

we can use the same trick in reverse to find antiderivatives.

ex:

$$\int 2\,x\ \cos(x^2)\,\mathrm{d}x$$

next time

- read § 5.6 and § 6.1
- paper homework 1 due
- we will discuss logarithms and finding area between curves