MATH 3B FTC, U-SUB, INTEGRATION BY PARTS

Midterm1 (1/29): I posted a **review sheet** on my website math.uscb.edu/~cindytsy. Also:

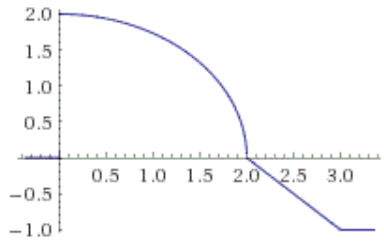
1) Do the **worksheets** and **concept check** posted by Baldvin on Gauchospace.
2) My regular mathlab hours: **M 1-3**, Extra office hours: **M (1/28) 12-1**

I. Fundamental Theorem of Calculus (Part 1)

Statement of the theorem: If $g(x) = \int_c^x f(t)dt$, then

How do we make sense of this statement?

Example. Let $g(x) = \int_0^x f(t)dt$ where $f(t)$ is the function



consisting of a quarter-circle and two straight lines.

1) Find $g(3)$. What does $g(3)$ represent in terms of the graph?

2) Find $g'(3)$. What does $g'(3)$ represent in terms of the graph?

3) Does $g(x)$ have a local maximum? If yes, where?

4) Is $g(x)$ ever concave down? If yes, where?

Example. Find $g'(x)$ if $g(x) = \int_{\ln x}^{x^2} \sin(e^t)dt$.

II. U-Substitution

When do we use u-sub?

Example. Find $\int \cos(2x)dx$.

Example. Find $\int \frac{3x}{1+2x^2}dx$.

Example. Find $\int \cos^3(x)\sin(x)dx$.

III. Integration by Parts

What is the formula for integration by parts?

How do we decide what u and dv are?

When do we use integration by parts?

Example. Find $\int x^2 \ln x dx$.

Example. Find $\int x\sin(4x)dx$.

***Example.** Find $\int \cos(\sqrt{x})dx$
