

Math 1210-3  
Wednesday April 23

We will finish the half-disk example of moments and centers of mass

(and the mysterious formula for  $M_x$  on yesterday's notes).

And then we'll discuss the amazing Pappus' Theorem (A.D. 300), which ties together many of the chapter 5 ideas

pages 3-4 Tues.

Webworks-like problems (sets 10, 9), tomorrow, Thurs, JTB 140, 9:30-11:00 a.m.

Go over practice exam(s) Monday night next week, also JTB 140, 7:00-9:00 p.m.  
exams & solutions are posted.

- Final exam will address concepts, computations, applications. (Wednesday, 8-10 a.m.)
- You may use 1 customized 4x6 index card of formulas, etc.
- You may use a scientific calculator (it might even help!)
- I will provide the Vanberg pull-out sheet ("Formula card"), as part of the final exam

### Key concepts

#### Derivative

average & instantaneous rate of change

precise limit def

$$f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$$

graphical interpretations

antiderivatives

#### Definite integral

precise limit def

$$\int_a^b f(x) dx = \lim_{\|P\| \rightarrow 0} \sum_{i=1}^n f(\bar{x}_i) \Delta x_i$$

FTC, which relates these two fundamental concepts:

$$\int_a^b f(x) dx = F(b) - F(a) \quad \text{if } F'(x) = f(x) \text{ on } [a, b].$$

### Quick computations

limits (know limit thms)

differentiation (know differentiation rules!)

antidifferentiation

definite integrals

substitution in definite & indefinite integrals

numerical integration (trap., parab. rules)

Newton's method

Applications (not all of these fit on one exam; I will need to make choices! Make sure to learn chapter 5, because up to 40% of the final exam would draw on this material.)

velocity, acceleration, position  
implicit differentiation  
related rates  
max-min  
graphing  
INC, DEC, CV, CD, asymptotes, extreme

chapter 5! {  
separable DE's  
area of regions in the plane  
average value  
volumes  
slabs (planar slicing), including disks & washers  
cylindrical shells  
curve length  
surface area of revolution  
work (of the sort we did)  
moments & centers of mass  
Pappus' thm.