

□ wrap up translating 'word problems' into ODEs
(notes scanned/posted separately)

□ solving ODEs

$$- \frac{dy}{dx} = f(x) \rightarrow y(x) = \int f(x) dx$$

$$- \frac{dy}{dx} = g(y) \rightarrow \text{autonomous eqns.}$$

$$\text{assume that } g(y) \neq 0 \rightarrow h(y) = \frac{1}{g(y)}$$

$$\frac{dy}{dx} = \frac{1}{h(y)} \rightsquigarrow \int h(y) dy = \int dx = x + c$$

$\Rightarrow$ solve $\int h(y) dy$ and hopefully you can rearrange and write down $y(x)$

$\Rightarrow$ thus, solving ODEs turns into an integration problem

Fundamental Theorem of Calc. if f is cont. on $t \in [a, b]$
and $f(t) = \frac{d}{dt} F(t)$

$$\text{then } \int_a^b f(t) dt = F(b) - F(a)$$

Ch. 6 discusses
notion of solving
integrals via
'constructing anti-derivatives'

H.H. Ch. 5.4
for review of
general props. of
integrals

H.H. pg. 299, Theorem 6.2

[pg. 2]

if f is a cont. function on $t \in [a, x]$ and a is any # on that interval, then

$$F(x) = \int_a^x f(t) dt$$

(Second Fundamental Theorem of Calc.)