Math 2250-1
Tuesday 26 Aug. JFB 103 !!

- Go over the murder mystery on page 3 of Monday's notes - Hopefully you worked this out yesterday after class.
- Discuss oscillation (3) & projectiles (4) on page 2 Monday. notes.

§1.2 1^{st} order DE's you solve by antidifferentiation

$$\frac{dy}{dx} = f(x) \quad \xrightarrow{\text{sol'n}} \quad y = \int f(x)\,dx$$

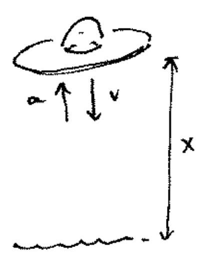
↑ y does not appear on RHS

example 1 Solve the initial value problem

$$\text{IVP} \begin{cases} \frac{dy}{dx} = x - 3 \\ y(1) = 2 \end{cases}$$

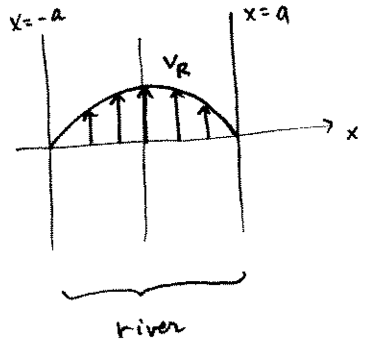
ans. $y = \frac{x^2}{2} - 3x + \frac{9}{2}$

example 2 : p. 12-13 text : lunar lander problem

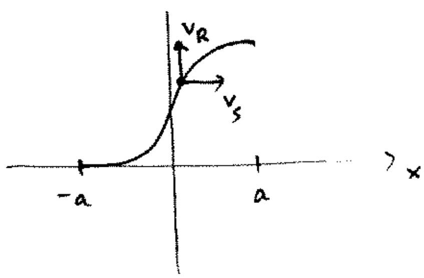


velocity to moon is 450 m/s. retro-rockets provide decelleration of 2.5 m/s^2. At what height to fire rockets to get soft landing, i.e. $v = 0$ exactly when height $x = 0$?

<u>example 3</u> (actually example 4, the swimmer's problem, page 15)



$v_R = v_0\left(1 - \frac{x^2}{a^2}\right)$ is velocity profile of river water



swimmer swims due east with constant velocity v_s.
she starts at $(-a, 0)$.

find the function $y = f(x)$ whose graph is describing her route!!

then, if ~~a~~ river is 1 mile wide
if $v_s = 3$ mi/h (this is a very good swimmer)
$v_0 = 9$ mi/h (pretty fast river)

where does swimmer land on opposite shore?

example 4 The velocity $v = \frac{dx}{dt}$ of a car traveling along the x-axis is shown in the following graph. The car starts at $x_0 = 0$.
Sketch the graph of its location at time t (and, find a formula for $x(t)$!)
How far did the car travel, $0 \le t \le 3$ minutes?