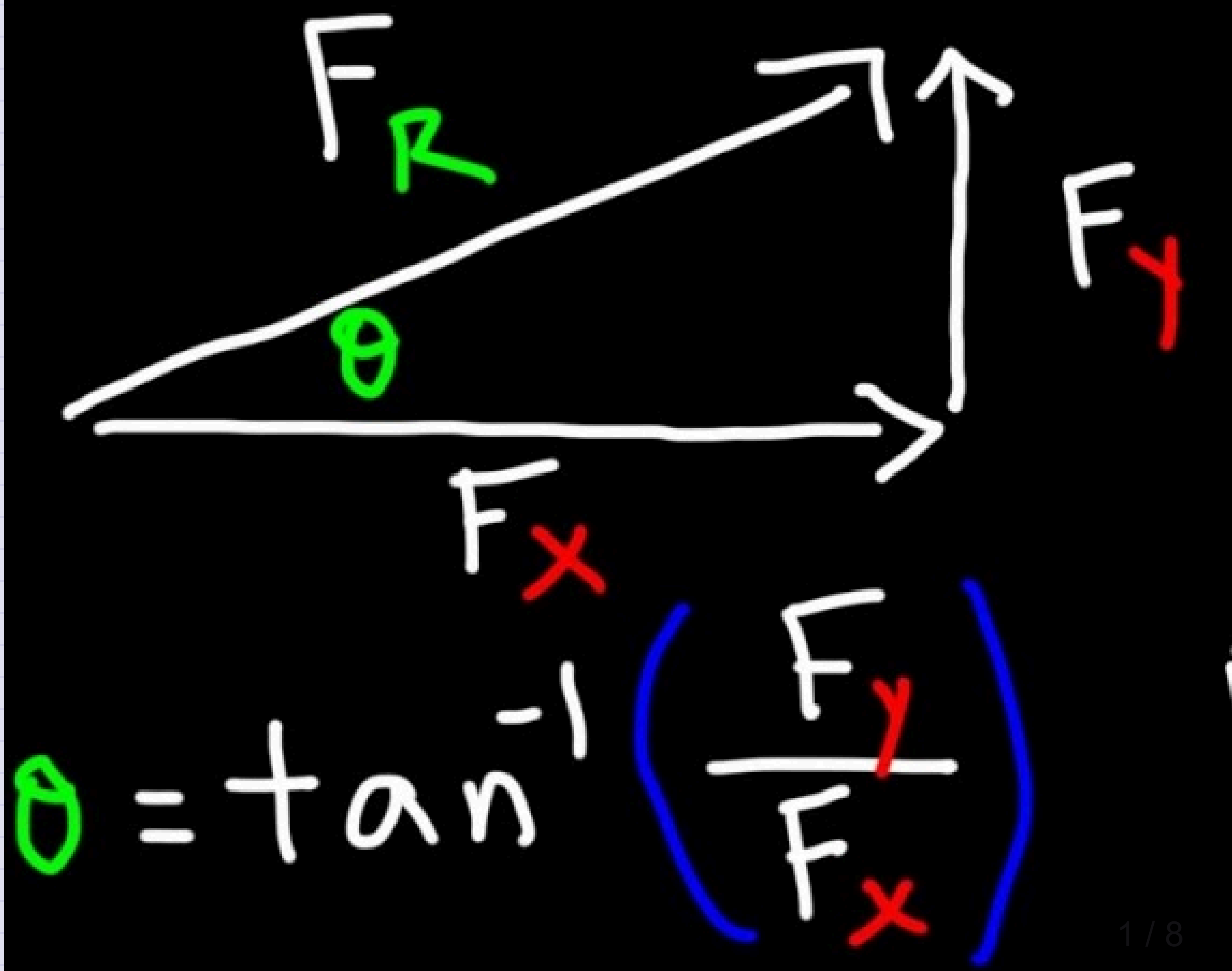
Day 05 - Help Session



AI Policy Proposals

Thanks for the discussion and input; here's 4 proposals for using AI in our class:

- **Proposal 1:** We adopt a policy that does not allow AI use at all.
  Violation results in a failing grade on assignment.
  Repeated violations result in failing the course.
- **Proposal 2:** We adopt a policy that allows AI use for brainstorming, help, and editing.
  AI cannot be used for direct answers or completion of assignments.
  We expect documentation of AI use, but it can be informal.
  Violations are discussed with Danny; the first violation requires a redo of the assignment, and repeated violations result in a failing grade.

AI Policy Proposals

- **Proposal 3**: We adopt a policy that allows AI for use in nearly any way.
  We require detailed documentation of use; this means screenshots, prompts, responses, and outcomes.
  Violations are discussed with Danny; the first violation requires a redo of the assignment, and repeated violations result in a failing grade.
- **Proposal 4**: We adopt a policy that allows AI for use in any way with no documentation required.
  Violations of the policy are limited to sharing answers or solutions with others.

Announcements

- Homework 1 is due today
- Homework 2 is posted
- Help Session today 2-4pm (1248 BPS); DC has to run out from 2:10-2:30.
- More help hours next week; evening also
- Vote here for our AI policy: https://forms.cloud.microsoft/r/0GT4umz7qY

Homework 1 - Exercise 4

- 4a (3pt) Show that the cross products are distribuitive $\boldsymbol{a} \times (\boldsymbol{b} + \boldsymbol{c}) = \boldsymbol{a} \times \boldsymbol{b} + \boldsymbol{a} \times \boldsymbol{c}$.
- 4b (2pt) Use this result to demonstrate that the sum of the torques about a single pivot for any number of forces $\mathbf{F}_i$ is equal to the torque by the net force $\mathbf{F}_{net} = \sum \mathbf{F}_i$. How might this simplify future work?

Homework 1 - Exercise 4

- 4c (3pt) Show that $\frac{d}{dt}(\boldsymbol{a} \times \boldsymbol{b}) = \boldsymbol{a} \times \frac{d\boldsymbol{b}}{dt} + \frac{d\boldsymbol{a}}{dt} \times \boldsymbol{b}$. Be careful with the order of factors.
- 4d (2pt) Use this result to show what the time derivative of angular momentum can be reduced to. Start from $\mathbf{L} = \mathbf{r} \times \mathbf{p}$; you can assume v is sufficiently small so that $\mathbf{p} = m\mathbf{v}$.

Homework 2 - Exercise 6

A ball is thrown with initial speed v_0 up an inclined plane. The plane is inclined at an angle ϕ above the horizontal, and the ball's initial velocity is at an angle θ above the plane. Choose axes with x measured up the slope, y normal to the slope, and z across it.

- 6a (5 pt) Write down Newton's second law using these axes and find the ball's position as a function of time. **Make sure to include the FBD and any assumptions you make.**
- 6b (5 pt) Show that the ball lands a distance

$$R = 2v_0^2 \frac{\sin\theta\cos(\theta+\phi)}{g\cos^2\phi}$$

from its launch point. **This is measured up the ramp (i.e., along it).**

Homework 2 - Exercise 6

- 6c (5 pt) Show that for given v_0 and ϕ, the maximum range up the inclined plane is:

$$R_{\max} = \frac{v_0^2}{g(1 + \sin\phi)}$$