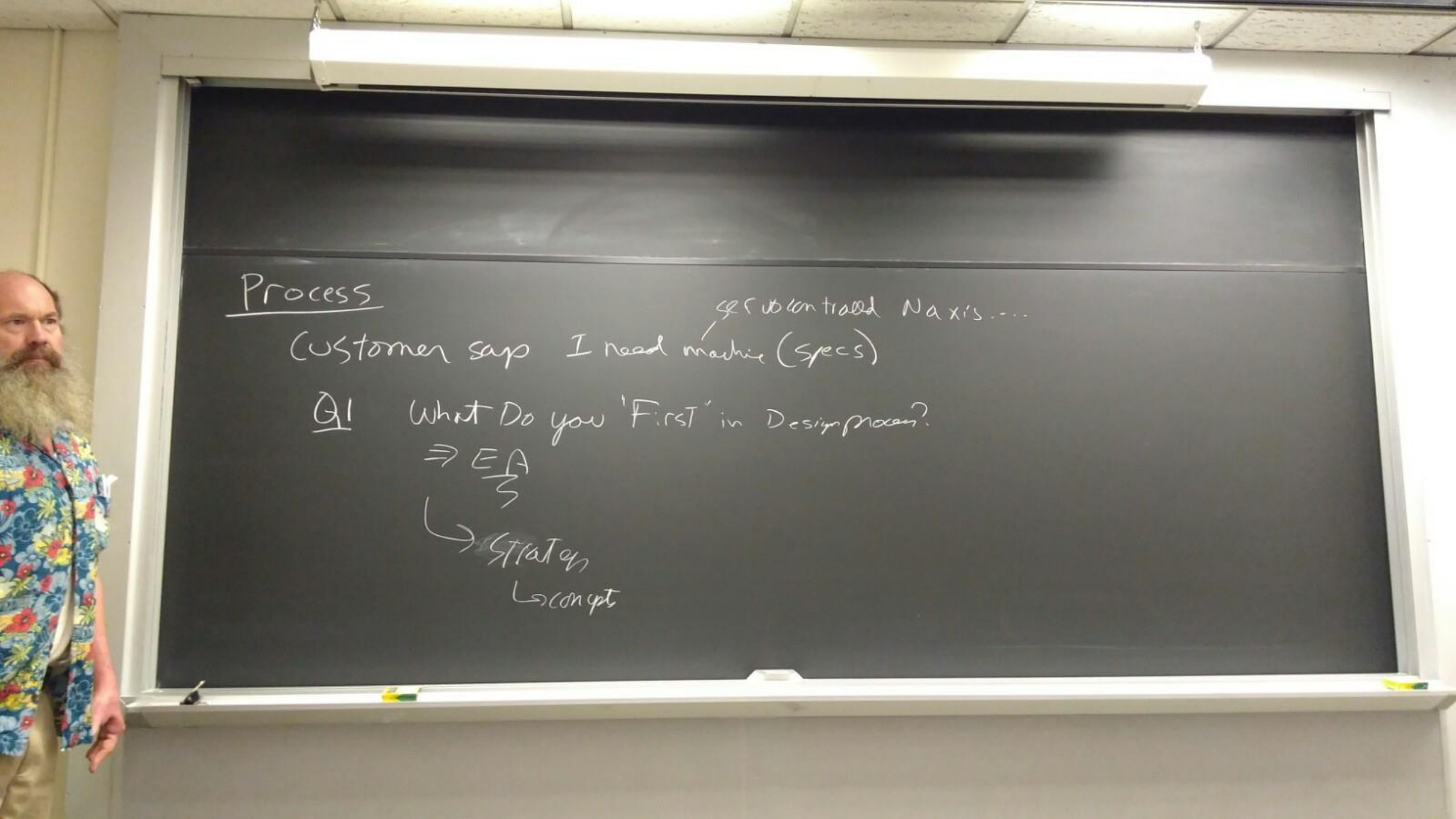
2.70 In-class exam review

05/15/2017


Process
Customer says I need machine (specs)
servo controlled Naxis....
Q1 What Do you 'First' in Design process?
⇒ EA
↳ Strategy
↳ concepts

Process

Structure — Nowhere idea. Size X section -
Overestimate of ω_n?

$\Rightarrow K_{\underline{\text{structure}}}$ What K expect to need for an axis' bearings?

Process

2 main areas to look at

⇒ Structure ⇒ Deflections } errors

⇒ Bearings ⇒ Geometric }

Structure.

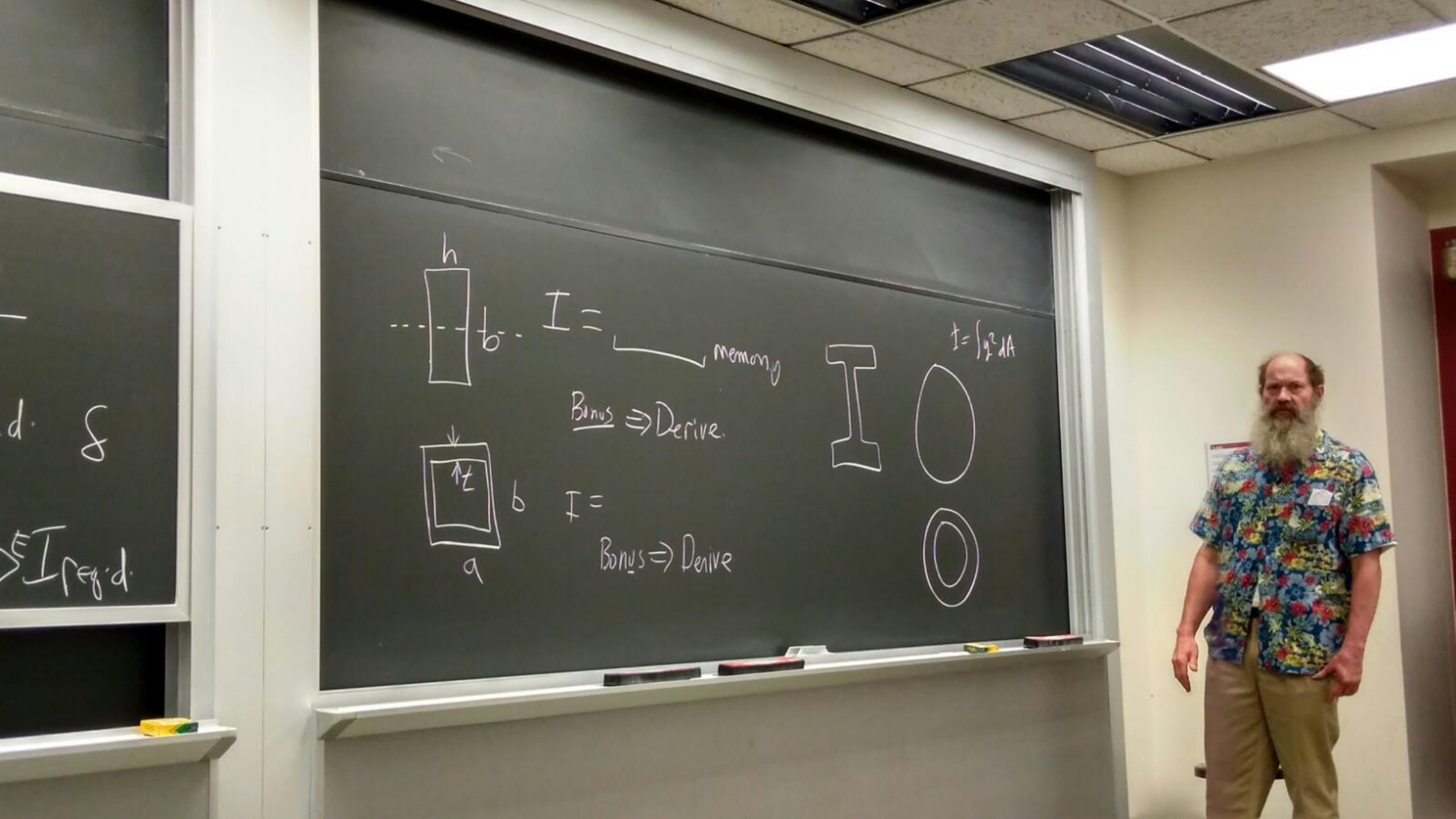
⇒ Size (reach) L

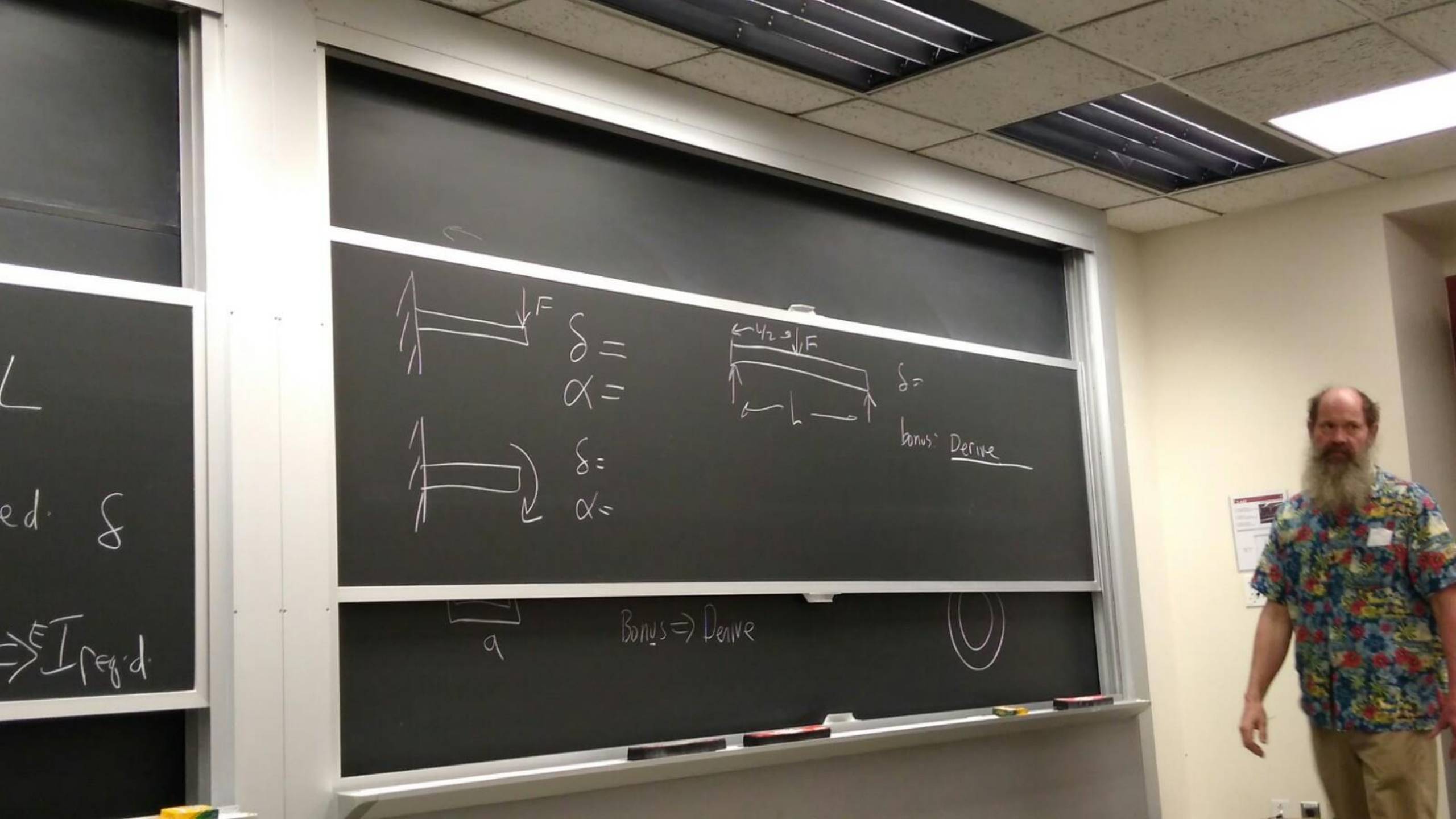
Load F

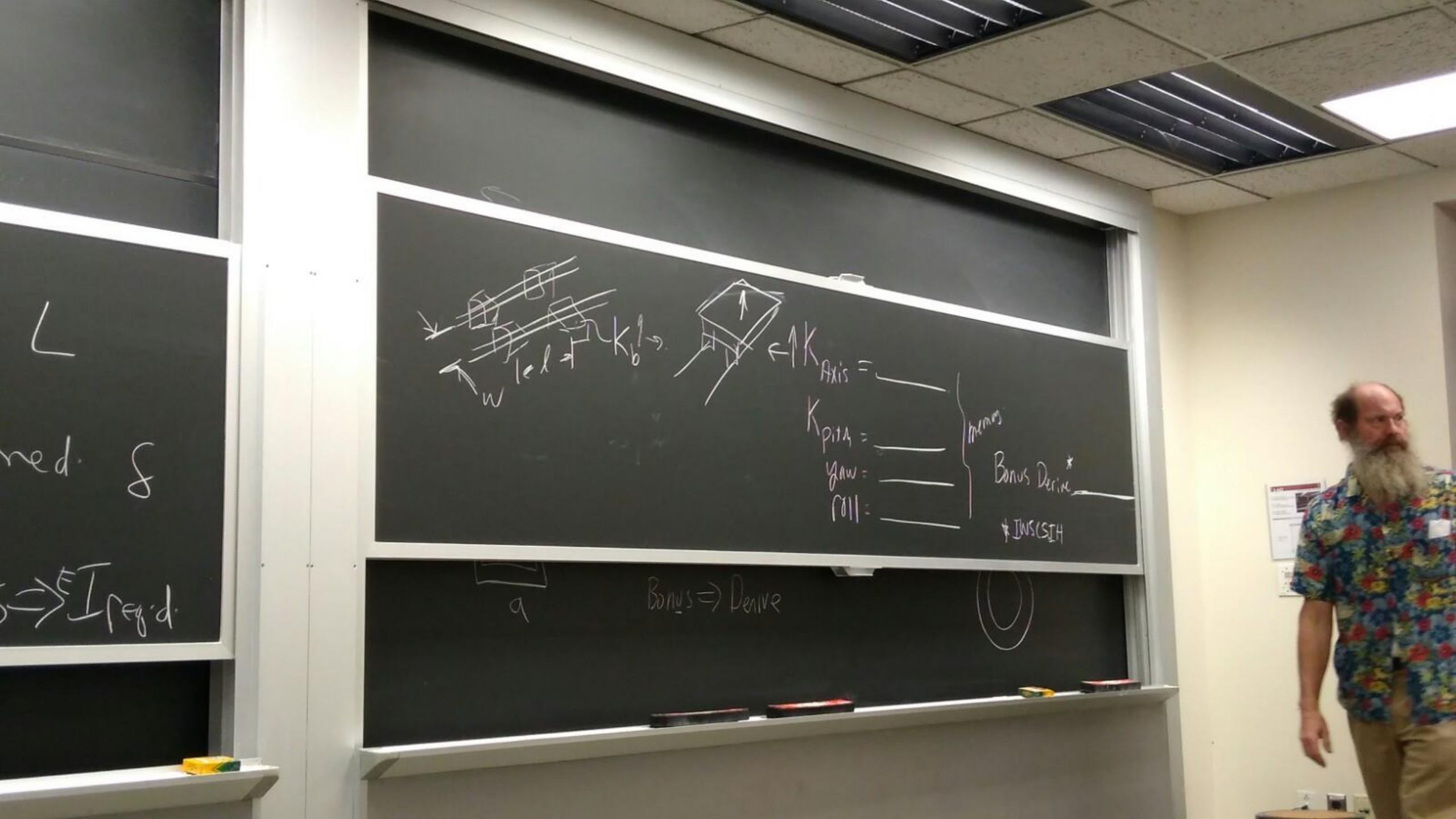
error apportioned. &

What do you Do?

⇒ Cantilever ⇒ SS ⇒ I req'd.


h
b
I =
memory
Bonus ⇒ Derive
I = ∫y² dA
t
b
a
I =
Bonus ⇒ Derive


F
δ=
α=
L/2
F
δ=
bonus: Derive
δ=
α=
q
Bonus ⇒ Derive


L
med. &
⇒ I req'd.
w
l e d
K_b
K_{Axis} =
K_{pitch} =
yaw =
roll =
Bonus Desire*
* IWSCSIH
q
Bonus ⇒ Derive

2b F

a

$\delta =$ _____

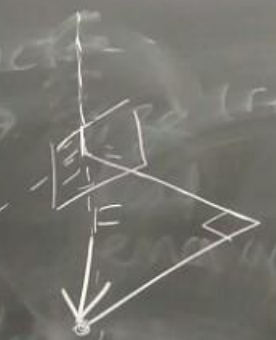
a F

b

or ?

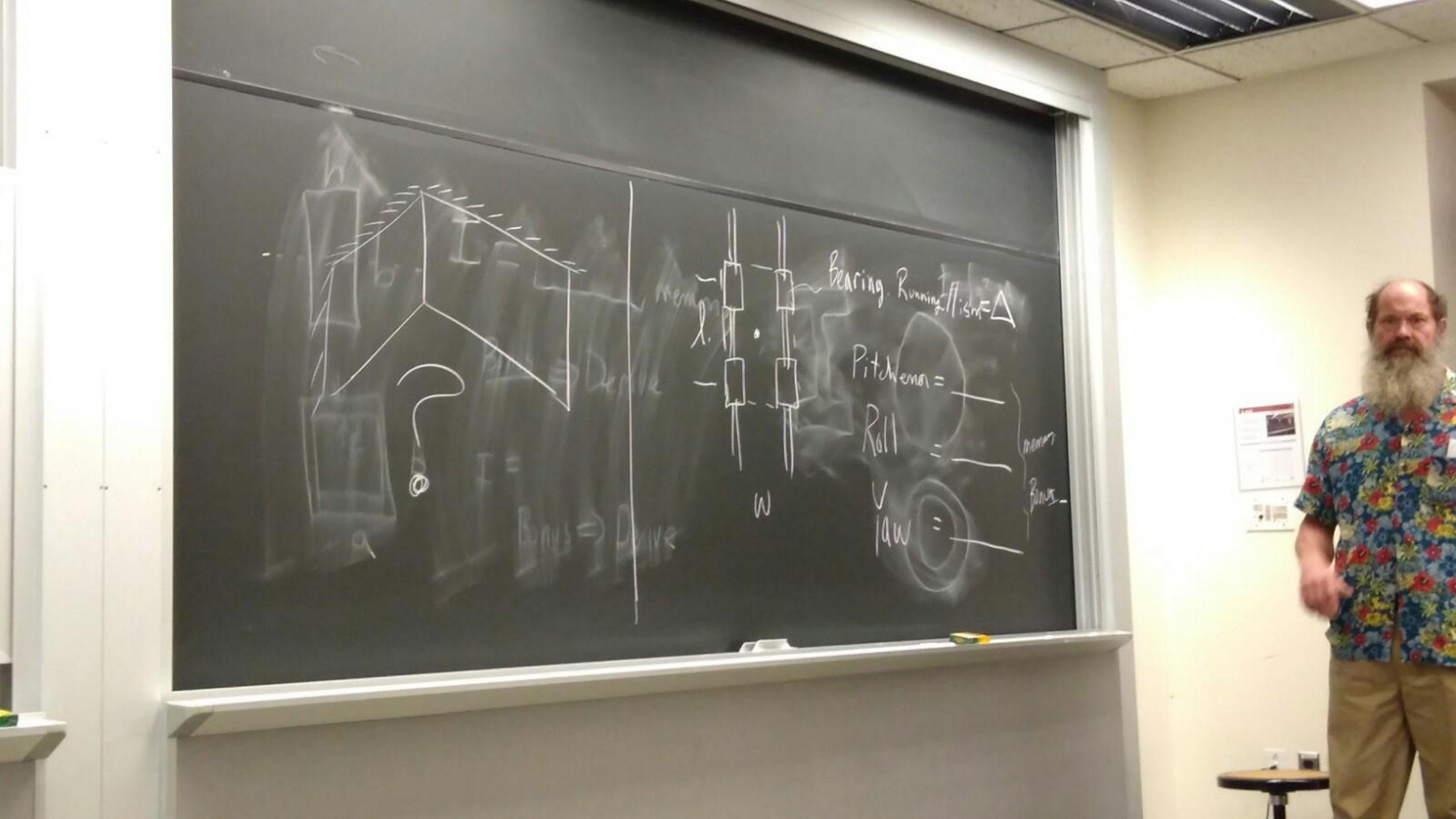
Which is better?

& Why _____



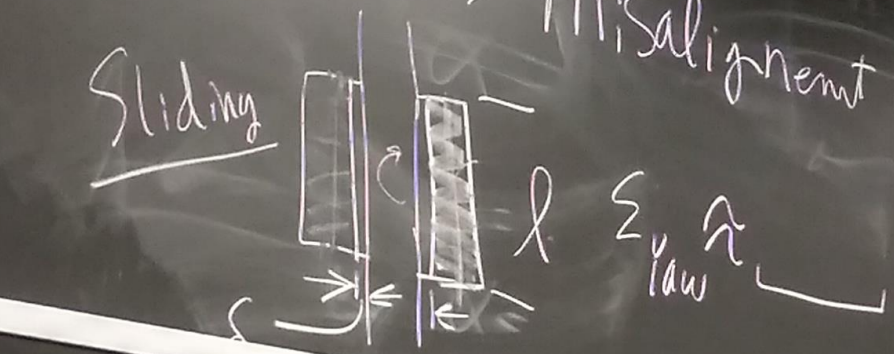
L

$\delta =$ _____


Bearing Runningtrue = Δ
Pitch error =
Roll =
Yaw =
W

⇒ Bearings ⇒ Misalignment in Rails causing Use up allowable Load.

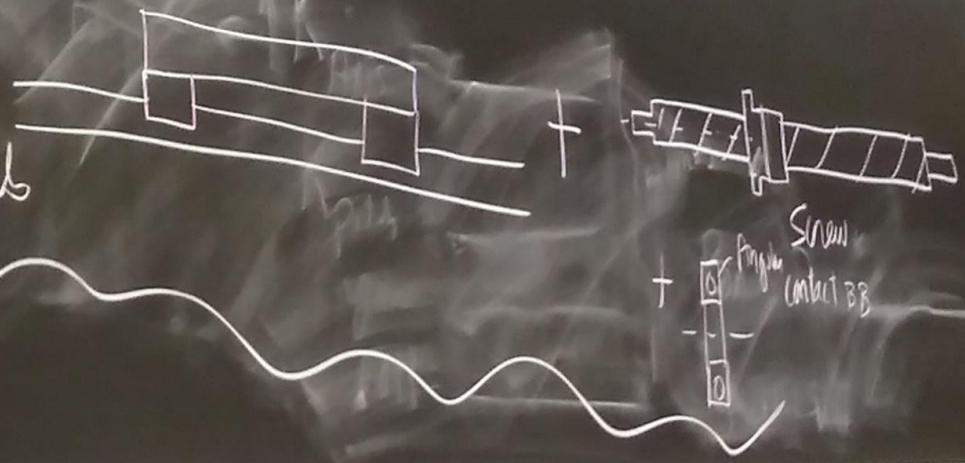
Sliding

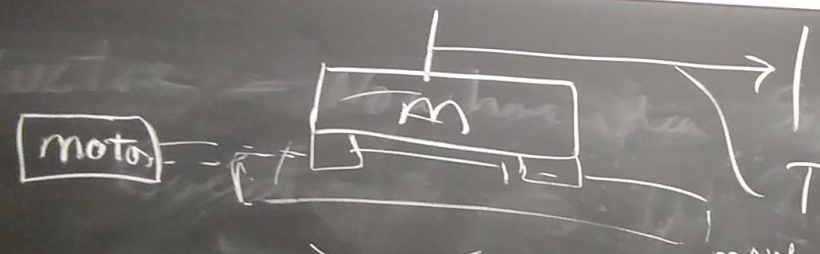


Actuation

Sketch Details

Lanky





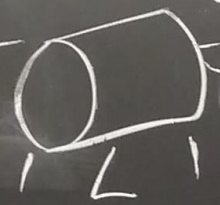
Travel = X_d.

move

time = t_m

Size motor

?



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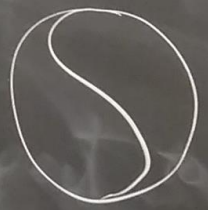
Aachens Rajos

Tell me Assumptions.



Harmoney

WWPSD
TFF JG
AGFABR
JSB

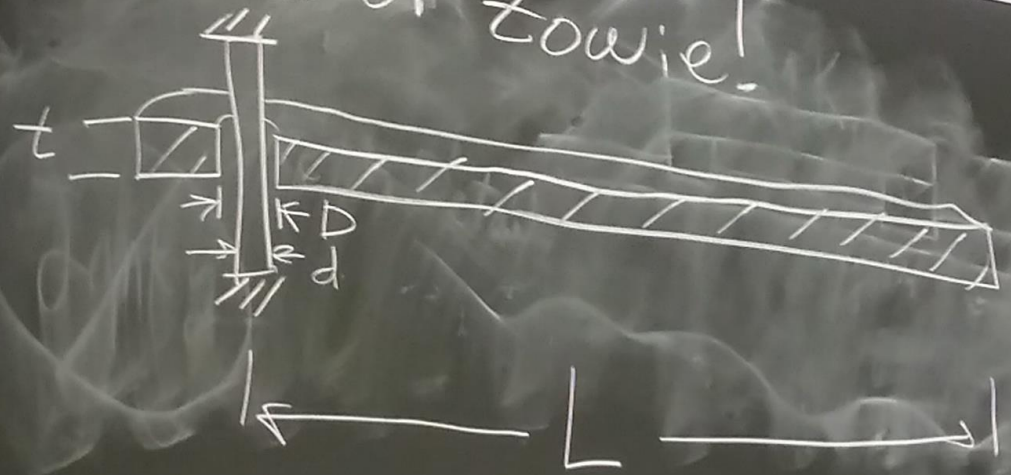
Pictures of stuff —

Sketch on Them The Structural Loop

↳ Tool ⇒ Workpiece

⇒ Bearings ⇒ Misalignment in Cab causing Use up allowable Load.

Owie or Zowie!



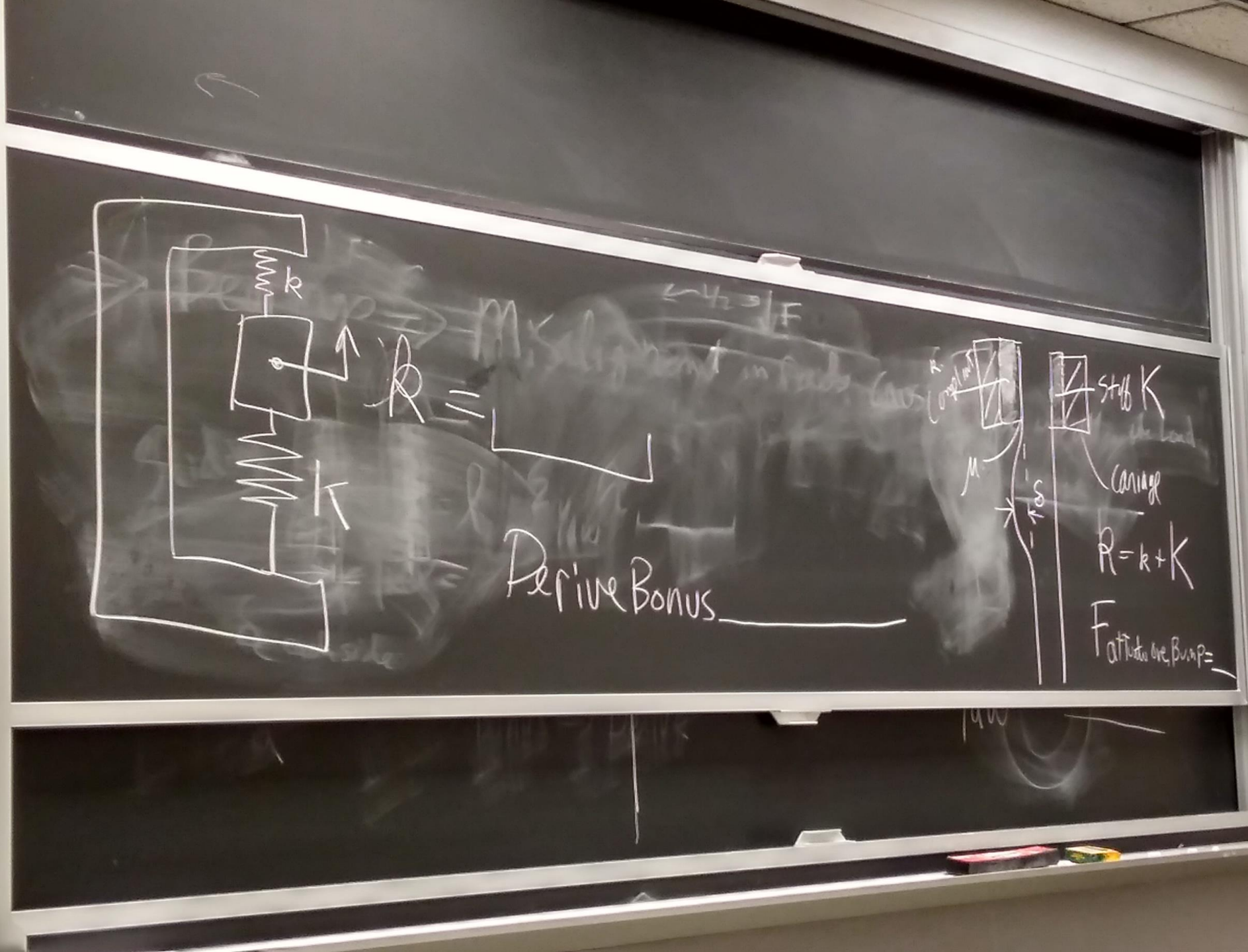
$\delta =$ (owie)

1 owie

Sketch & list calcs

(Fix it!)

$\Delta w =$


k
R =
k
Derive Bonus
M
δ
Stiff K
carriage
R = k + K
F attitude bump =

Coal 900 million tons Coal.

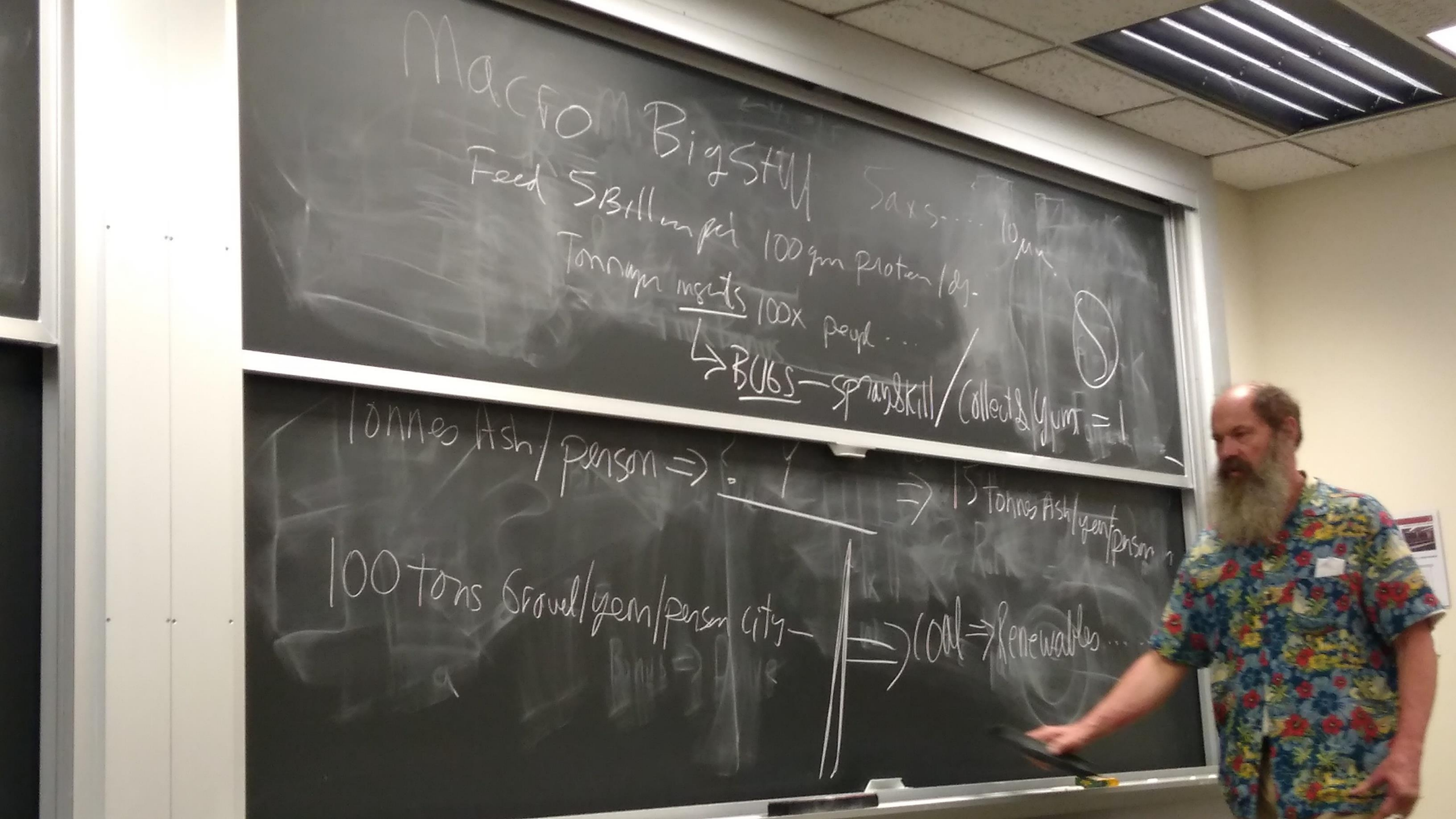
2.2 $\frac{kWh}{lb}$

⇒ how many Tons (1000kg) Coal./Person/year. ⇒ 2kW "24/7" Person?

1 ton coal ≈ 100kg "Combustion products" (Solids) ≈ 50kg "usable" ash

≈ 40 million Tons Ash ≈ 20 million tons Ash/year.

⇒ 40% ⇒ cement


Macro Bigstuff
Feed 5B ppl 100 gm protein/dy.
Tonnage insects 100x peopl...
↳ BUGS — Spray Skill / Collect & Yum = 1
Tonnes fish/person ⇒ ⇒ 15 Tonnes fish/yr/person
100 tons Growl/yr/person city —
⇒ Coal ⇒ Renewables

2.2 kWh / lb

million tons coal

⇒ how many Tonne (1000kg) Coal / person / year. ⇒ 2kw "24/7" person?

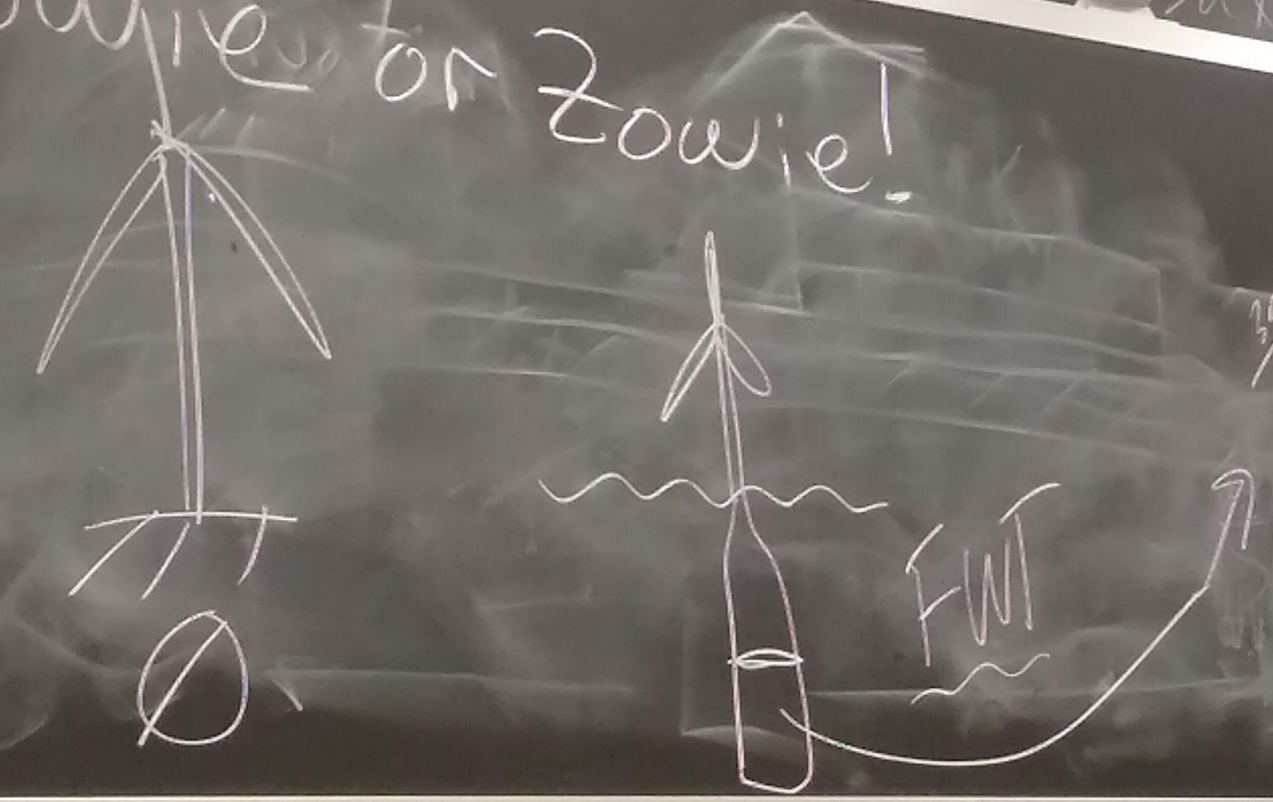
10 tons ash / person / year ⇒ 2kw power 24/7 avg ~ 5kw "nameplate"

4000 tons Arsenic / 4000 tons ⇒ $27 Billion

600–1000 million tons Ash / year.

MacroM BigStuff

Owie or Zowie!



$100/ton ⇒ ~$6 million

5700 tons concrete Ballast

Lyons Supply Ash Core FWT

100 tons Gravel/year/person/city ⇒ COM ⇒ Renewables ....