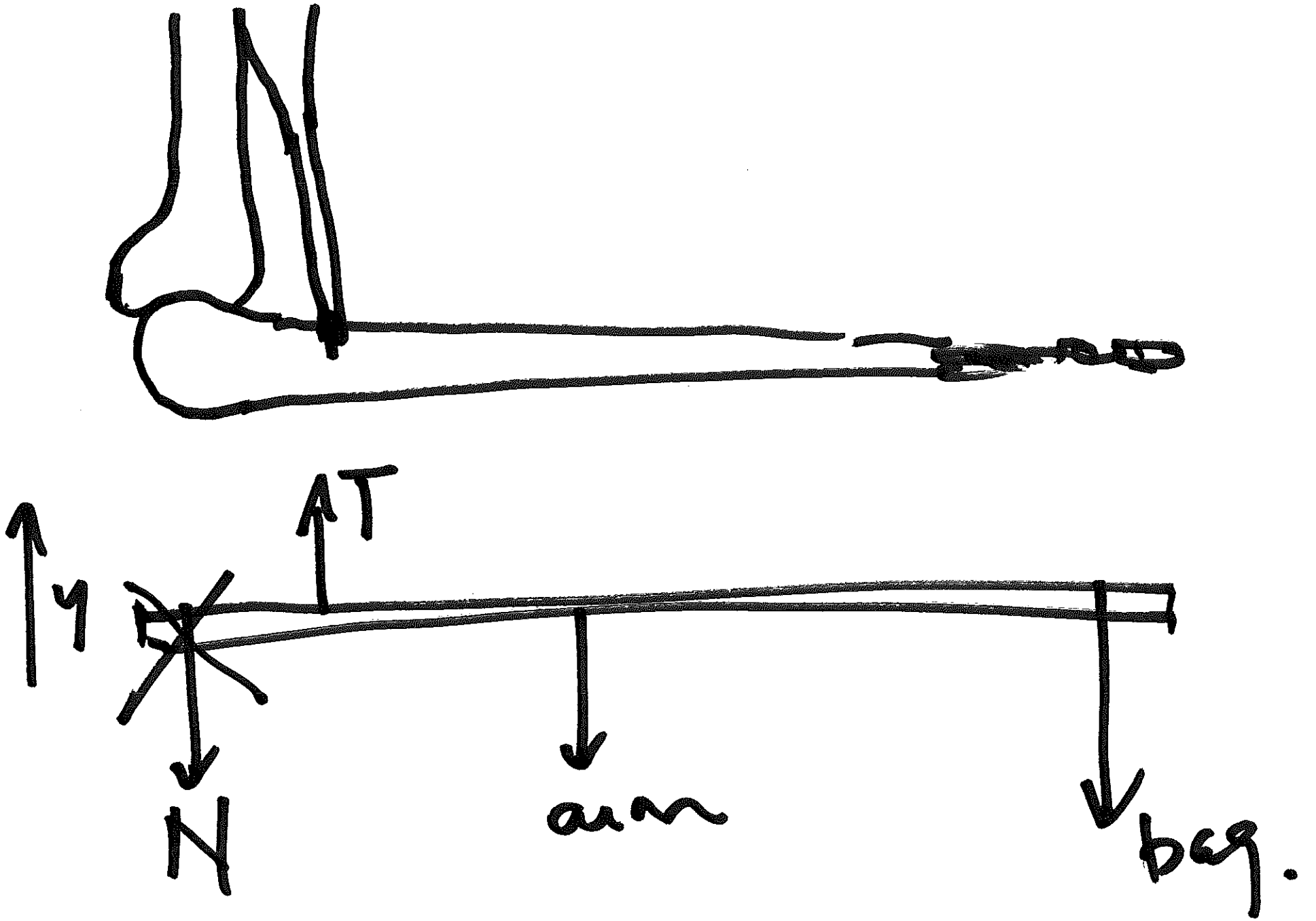
NYU Physics I

2018-10-23

- working together
- Qs.
- Simple harmonic oscillator.
- Exam 3.

- S.H.O.


T
y
N
am
bag.

$$\frac{d^2x}{dt^2} + \frac{k}{m}x = 0$$

k: $\frac{\text{force}}{\text{length}}$: $\frac{\text{mass} \cdot \text{accel}}{\text{length}}$

$\frac{k}{m}$: $\frac{\text{accel}}{\text{length}} = \frac{1}{\text{time}^2}$

$$\frac{d^2x}{dt^2} + \frac{g}{\ell}x = 0$$

$\frac{1}{\text{time}^2}$

$\frac{d^2}{dt^2}$ operator

x function.

guess & check!

(A) $x(t) = A \cos \omega t$

$\omega \sim \frac{1}{\text{time}}$

(B) $x(t) = Ae^{\alpha t}$ ← math says this!

(C) $x(t) = A \sin \omega t$

$A\cos\omega t = x(t)$

$-\omega A\sin\omega t = v(t)$

$-\omega^2 A\cos\omega t = \frac{d^2x}{dt^2}$

$\frac{d^2x}{dt^2} + \frac{k}{m}x = 0$

$Ae^{\alpha t} = x(t)$

$\alpha Ae^{\alpha t} = v(t)$

$\alpha^2 Ae^{\alpha t} = \frac{d^2x}{dt^2}$

$A\sin\omega t = x(t)$

$\omega A\cos\omega t$

$-\omega^2 A\sin\omega t = \frac{d^2x}{dt^2}$

$$\frac{1.2}{180} = 0.0067 = 0.007$$

$$\frac{320}{80} = 4$$