TODAY: Pop talks

- Kyle — HW1b 8c 2f
- Sergio — Ly α
- Tommy — HW1b 1
- Chris C. — HW1b 3
- John Lee — HW1b (2.1) + BC

NEXT WK: OCT 17

- Michael W. — WHAT IS THE NSF GRFP
- Shirash R. — WHAT TO EXPECT FROM TA'ing A LAB
- Mechanie C. — HOW TO ACCESS LIBRARY RESOURCES off CAMPUS
- Mehmet K. — WHAT KIND of SCIENCE OUTREACH CAN YOU DO?
- Cameron R. — WHAT DOES THE GRAD STUDENT RESOURCE CENTER offer for PHYS / Astro students?

INDEX CARD:

- something you liked about talks
- something you want to avoid in your own talks.

AWESOME/JARGON CARDS

if time

INNER PRODUCT / DOT PRODUCT / METRIC :

$g(\underline{v}, \underline{w}) = \#$ ← spits out #

takes 2 vectors

such that: linear in each argument

$g(\alpha\underline{v} + \beta\underline{v}', \gamma\underline{w} + \delta\underline{w}') = \alpha\gamma\, g(\underline{v}, \underline{w}) + \alpha\delta\, g(\underline{v}, \underline{w}') + \cdots$

special: symmetric: $g(\underline{v}, \underline{w}) = g(\underline{w}, \underline{v})$

in indices: $g = g_{ij} \langle i| \otimes \langle j|$

$g(\underline{v}, \underline{w}) = g_{ij} v^i w^j$

$(g_{ij} \langle i| \otimes \langle j|)(v^k |k\rangle)(w^\ell |\ell\rangle)$

$= g_{ij} v^k w^\ell \delta^i_k \delta^j_\ell$

$= g_{ij} v^i w^j$

for ordinary EUCLIDEAN space ← flat & flat-coords

$g_{ij} = (1, 1, \ldots)$

in Minkowski space-time: minus sign
in spherical coordinates: it's ugly.

OBSERVE: metric-with-an-argument-pre-loaded

$g(\underline{v}, \_)$: takes vector, spits out #, linear

this is exactly what a row vector is!

$g(\underline{v}, \_) = g_{ij} v^i \langle j|$

$g_{ij} v^i$ ROW VEC COMPONENTS

Remarks: generalize to complex #'s

RATHER THAN TRANSPOSE,
HERMITIAN CONJUGATE

$\langle x| \sim |x\rangle^\dagger$

"transpose, complex conj"

$\dagger : |x\rangle \to \langle x, \cdot \rangle$

inner product
JUST DIFF. NOTATION
FOR $g(\underline{v}, \underline{w}) = \langle \underline{v}, \underline{w} \rangle$

"usual"

Puzzle: what is the inner product on function space? (eg for wavefunctions)

hint: $\langle x, x \rangle = \langle x|x \rangle = \|x\|^2$

"norm"