

Physics 518: 1st pretest (7 January 2008)

Do not write your name on this pretest; it will *not* be graded. It serves as a warm-up exercise for a new topic, and gives me an idea of your level of prior knowledge.

ROTATIONS

1. Consider a rotation about the z -axis by an angle θ (rotation direction defined by the right-hand rule). This rotation takes the position vector r_i ($i = 1, 3$) into another vector r'_i , which is related to r_i by

$$r'_i = \sum_j R_{ij} r_j.$$

Here R_{ij} is a 3×3 matrix depending on θ , but independent of r_i or r'_i .

Determine R_{ij} .

2. A translation can be characterized by a vector $\vec{\Delta}$, $r'_i = r_i + \Delta_i$. How (and with how many parameters) can one characterize a general rotation?

Please turn over.

FRIDAY SESSIONS

I have not decided how to use the Friday sessions, and would like to have your input. Possibilities include (a) lecturing, while slowing the pace down in lectures; (b) discussion of homework sets due the following week (run by me or TA); (c) discussion of homeworks after they have been turned in (run by me or TA); (d) review before midterm and final. I suspect that a mix might be the best option. What are your thoughts?