

Hints: Assignment 2

21. The energy eigenfunctions for this problem can be found in Appendix A of the text. You should find an increasing uncertainty product with increasing energy.

22. There are many ways to approach this. Here's one. You can model the ice pick as a rigid rod with one fixed point of contact with the ground. Assume some very small uncertainty in the initial position of the ice pick. This corresponds to some minimum uncertainty in the initial momentum. This allows you (using classical Newtonian mechanics) to estimate the time for the pick to make a noticeable deviation from vertical (say 1 degree in angular displacement).

26-27. You may want to consult §1.5

27b. You will end up computing a 3-d Fourier transform from position space to momentum space. You should be able to reduce it to a single integral over the radius r .

30. To evaluate the commutator it is convenient to see what it does to the position basis.