

Math 413, Fall 2010
Homework 1. Due Friday 09/10/10

I. Do the following problems from Holmes textbook: 1.1, 1.4, 1.5, p.33–35

II. Additional problem.

In a nuclear explosion there is an instantaneous release of energy E in a small region of space. This produces a spherical shock wave, with the pressure inside the shock wave thousands of times greater than the initial air pressure, which may be neglected. Estimate how the radius of the shock wave from a nuclear explosion grows with time t .

(a) Assume that the radius R depends on E, t and the initial air density ρ_0 and write the corresponding dimensions.

(b) Assume some functional dependence form and determine the corresponding exponents.

(c) Write down the answer. Explain what data might be used to validate the model. (Avoid suggesting new nuclear experiments if possible.)