THE PENNSYLVANIA STATE UNIVERSITY
Department of Economics

Economics 428 — Gallant
Homework 3 — Fall 2021
Due September 30

This is an individual assignment in the sense that each individual must submit his or her answers. However, you should feel free to work with another classmate to solve the problems. Ultimately, it is important that each individual understand how to solve these problems because questions similar to these will appear on exams. Turn in via Canvas

1. Consider an airport that produces noise that decays as the distance d, in miles, from the airport increases: $N(d) = 1/d^2$. Fritz works at the airport. Fritz's damage from noise is \$1 per unit of noise and is associated with where Fritz lives. That is, if Fritz lives d miles from the airport his damage is $D(d) = (\$1)(1/d^2)$ and his marginal damage is $MD(d) = (\$1)(-2/d^3)$. His round-trip cost of commuting is \$2 per mile. The closest he can live to the airport is 0.1 mile.

   For example, if Fritz chooses to live five miles from the airport, it will cost him ten dollars per day to commute and he will suffer noise damage of four cents. If he lives one half mile from the airport his daily commuting expense is one dollar and his noise damage is four dollars.

   (a) Write an expression for Fritz's total costs (noise and transportation). Check your expression to be sure that if he lives one half mile from the airport his daily total cost is five dollars.

   (b) What is the distance that Fritz will live from the airport in the absence compensation for the noise? What are his total costs?

   (c) Suppose Fritz is compensated for his damage, wherever he may live. How close to the airport will he choose to live? How much will he be compensated?