

**GEOG 455 Exercise Four**  
**AIR POLLUTION CALCULATIONS**

15 points

Name: \_\_\_\_\_  
Student#: \_\_\_\_\_

The following problems are to be completed with the help of the air pollution program GAUS1\_new.EXE (GAUS1NP\_new.EXE is a version without echo printing), which runs on the PC. Both versions are available on the class home page together in a self-extracting (.exe) zip file. The program is designed to be easy to use, and provide explanations of what you are doing at all times. *However*, if you have problems, please see me.

\*\*\*NOTE\*\*\* **If possible**, include the output from the program to support your answers.

*Problems*

1. It is estimated that a burning dump emits 3 g/sec of oxides of nitrogen. What is the concentration of oxides of nitrogen from this source directly downwind at a distance of 3 km on an overcast night with wind speed of 7 m/sec? Assume this dump to be a point ground-level source with no effective rise.
2. It is estimated that 80 g/sec of sulfur dioxide is being emitted from a petroleum refinery from an average effective height of 60 meters. At 0800 on an overcast winter morning with the surface wind 6 m/sec, what is the ground level concentration directly downwind from the refinery at a distance of 500 meters?
3. Under the conditions of problem 2, what is the concentration at the same distance downwind but at a distance of 50 meters from the x-axis (i.e.  $y = 50$ )?
4. A power plant produces 151 g/sec of sulfur dioxide on a sunny summer afternoon with the winds at 4 m/sec from the northeast. The morning radiosonde taken at a nearby weather station has indicated that a frontal inversion aloft will limit the vertical mixing to 1500 meters. The effective height of emission is 150 meters. What is the distance to the maximum ground-level concentration, and what is the concentration at that point?
5. For the power plant in problem 4, at what distance does the maximum ground-level concentration occur and what is this concentration on an overcast day with wind speed of 4 m/sec?
6. For the conditions given in problem 4, draw a graph of ground-level centerline sulfur dioxide concentration with distance from 100 meters to 100 km. Use log-log graph paper.
7. For the conditions given in problem 4, draw a graph of ground-level concentration versus crosswind distance at a downwind distance of 1 km.





