

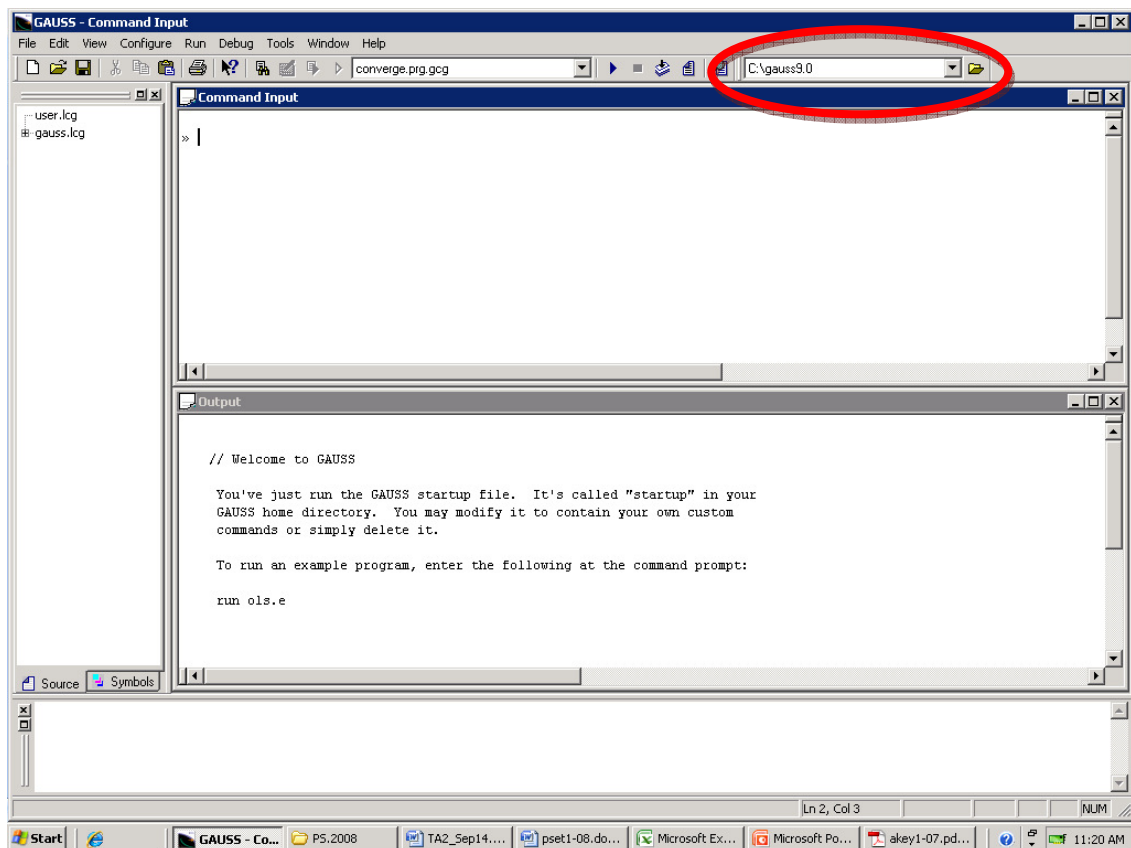
AAE374 Discussion Section  
Problem Set 1 & Gauss Software

1. Problem Set # 1: How to run Gauss
2. Ricardian Model ( $2 \times 2 \times 1$ )
  - a. Production possibility frontier (PPF)
  - b. Relative prices and arbitrage
  - c. Equilibrium

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1. **Problem Set # 1**

- Go to <http://www.aae.wisc.edu/aae374/> and download the gauss program files for PS1 (autarchy.prg.gcg, shop.prg.gcg, free.prg.gcg, pareto.prg.gcg, converge.prg.gcg). To download, right click on the link and select “save target as.” Save the file in your computer (i.e. C:/gauss9.0 directory) or in your flash memory.
- Run gauss (Start menu => All Programs => Statistics => Gauss 9.0) and select the folder in which you saved the programs.



- This will allow you to call out and use the different gauss programs you saved into the

specific folder, without having to write the specific path for each program.

a. **Autarchy Equilibrium** (no trade)

- Endowment

North:  $L = 25$ ,  $K = 40$

South:  $L = 30$ ,  $K = 10$

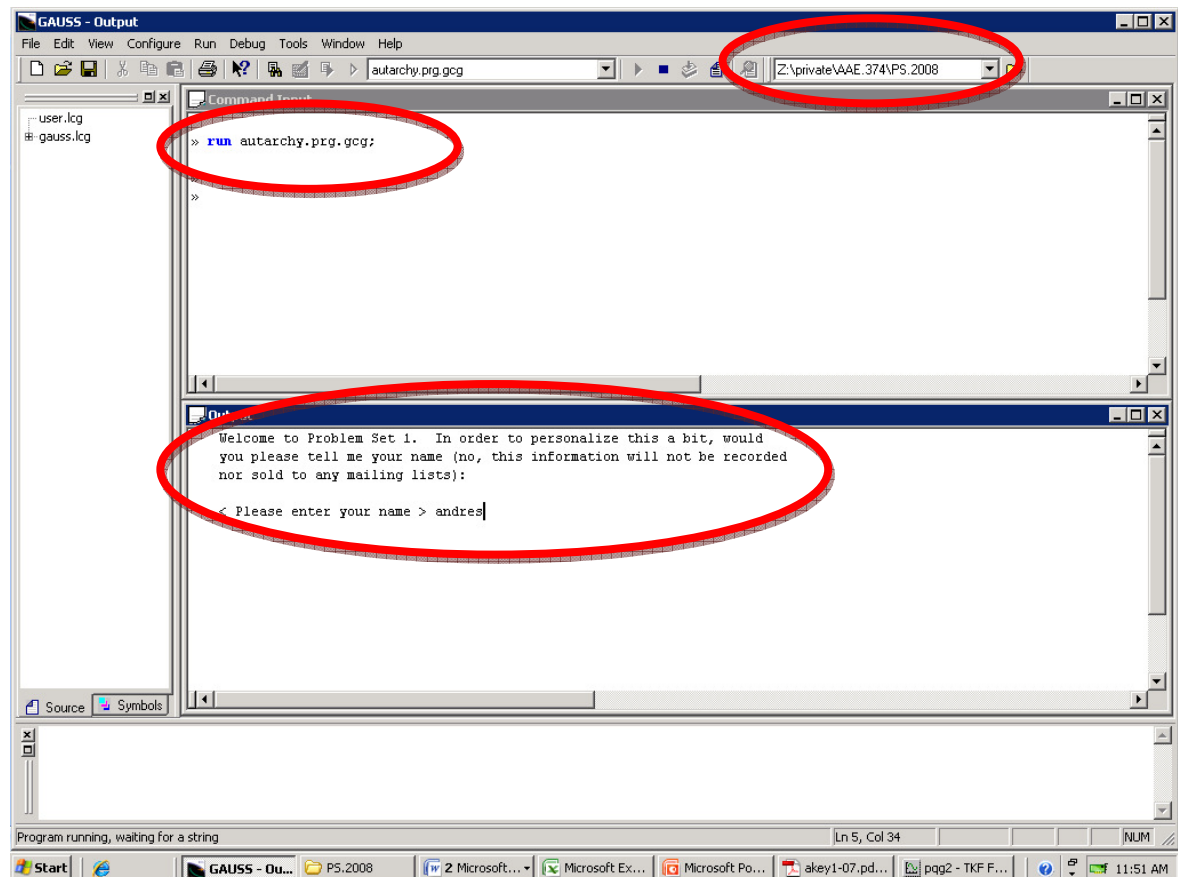
- Production function (technologies)

Agriculture:  $X_a = L^{0.8} K^{0.2}$

Manufacturing:  $X_m = L^{0.2} K^{0.8}$

- Cost of production (non-linear)

- Exercise 2 in PS1 will show you the model's predictions under Autarchy and Differential Scarcity in North and South. Go to the command window and type "run autarchy.prg.gcg;" <<enter>>



- The program will simulate the model under autarchy and from here on you just have to follow the instructions, and answer the questions on the problem set.
- Specific attention is given to the concepts of:
  - ✧ Production possibility frontier

- ✧ Relative prices
- ✧ Comparative advantage
- ✧ Production, consumption, and prices
- ✧ Scope for gains from trade

b. **Static gains from trade** (shop.prg.gcg)

- What happens if trade (or an alternative technology) is possible?
- Suppose that international price ratio  $p_a / p_c = 1$

- Trade balance  $p_a(Y_a - C_a) + p_c(Y_c - C_c) = 0$

c. **Free trade equilibrium** (free.prg.gcg)

- Trade balance  $p_a(Y_a^N - C_a^N) + p_c(Y_c^N - C_c^N) = 0$

- $p_a(Y_a^S - C_a^S) + p_c(Y_c^S - C_c^S) = 0$

- Market clearance conditions

Auto:  $(Y_a^N - C_a^N) + (Y_a^S - C_a^S) = 0$       Cotton:  $(Y_c^N - C_c^N) + (Y_c^S - C_c^S) = 0$

International price ratio  $p_a / p_c = 1$

- Utility and utility ratio between North & South

d. **Pareto Optimality** (pareto.prg.gcg)

- If you are a central planner, can you beat the market?
- Planned production & consumption
- Compare the level of utility

**2. Ricardian Model: 2 (countries) × 2 (commodities) × 1 (factor) Model**

**Producers**

- Endowment      600 units of labor in North & South
- Production function (technologies)

	North	South
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Auto	$Y_a = \frac{1}{10} L_a$	$Y_a = \frac{1}{40} L_a$
Cotton	$Y_c = \frac{1}{15} L_c$	$Y_c = \frac{1}{20} L_c$

Production Possibility Frontier (see 221.xls)

- North:  $Y_c = 40 - 2/3 \cdot Y_a$       South:  $Y_c = 30 - 2Y_a$
- Cost of production “How much cotton does North/South give up to produce 1 more auto?”
- What does this tells us about the opportunity cost of producing one more auto?  
Opportunity cost in both countries.
- Equilibria