AAE 320 Exam # 1 Review

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Goal

- Explain what to expect for exam
- Overview topics on exam
- Give idea of how to study
What to Expect

- Organization & format similar to previous exams
  - Mostly problems testing your knowledge of major concepts via mathematics
  - Other questions: true false and/or short answer, make graphs
  - Look at previous exams on the class page for example format and questions
We have covered four major topics
1) Partial Budgeting
2) Economically optimal input use with a single input production function
3) Economically optimal input use with a two input production function
4) Cost Economics: opportunity cost and economically optimal output level
Partial Budgeting

**Benefits:**
1) What new revenue will be increased or added?
2) What costs will be reduced or eliminated?

**Costs:**
3) What will be the new or added costs?
4) What revenues will be reduced or lost?

**Partial Budget:**
Calculate Net Benefit = Benefits – Costs

Think Break #1, Problem Set #1 Question 1
Examined economically optimal input use in tabular and functional forms

Economic problem: Choose $x$ to maximize

$$\pi = pf(x) - rx$$

Optimality condition: $VMP = r$ or $MP = r/p$

Tabular Approach: Think Brk #2 and #3, Problem Set #1 Question 2

Calculus Approach: Think Brk #4 and #5, Problem Set #1 Question 3
You will want to know calculus, as there will be a problem like Think Break #5, or Problem Set #1 Question 3
See Calculus review on homepage, plus notes and Think Break #4
Remember: set up problem, find FOC, solve for input X, check SOC, then find output and net returns/profit.
Two Input Production

- Examined economically optimal input use in tabular and functional forms
- Economic problem: Choose x and y to maximize 
  \[ \pi(x,y) = pf(x,y) - r_x x - r_y y \]
- Optimality conditions: \( \text{VMP}_x = r_x \) and \( \text{VMP}_y = r_y \),
  plus \( \frac{MP_x}{MP_y} = \frac{r_x}{r_y} \)
- Ratio of MP’s = Marginal Rate of Technical Substitution = Slope of Isoquant = \( - \frac{\Delta Y}{\Delta X} \)
  \[ - \frac{\Delta Y}{\Delta X} = \frac{r_x}{r_y} \] (notice the switch in x and y)

Isoquant = Tradeoff Curve between Inputs
Two Input Production

- Know how to find economically optimal input combination
- Tabular approach: MRTS = input price ratio (Think Break #7, Problem Set #2 Question 1)
- Calculus approach: (Think Break #8, Problem Set #2 Question 2)
- Partial Derivatives review: Think Break #6
- Remember: set up problem, find FOC’s, solve for inputs X and Y, check SOC, then find output and net returns/profit
Cost Economics

- We covered three topics in cost economics
- 1) Opportunity cost and economic profit
- 2) Different types of cost functions and their relations: TC, VC, FC, ATC, AVC, MC
- 3) Economically optimal output condition: $P = MC$ and the connection between $MC$, $\min ATC$, $\min AVC$, profit and supply
Opportunity Cost, Marginal Cost and Average Cost

- What it means if economic profit is positive, zero, or negative
- Marginal cost as the supply curve, how marginal cost, average total cost and average variable cost relate
- How MC, ATC, AVC connect to profit being positive, zero, or negative
- How to draw the standard plot of MC, ATC, AVC
- Think Break #11, Problem Set #3 Question 2
Don’t Forget

- Don’t forget about the first few lectures, the special topics and Let’s Talk About It!
- Expect some true/false and/or short answer that test basic knowledge of these
  - Wisconsin Agriculture
  - Nitrogen and Agriculture
  - More-On Principle
How to Study

- Know the Think Breaks and the Problem Sets and how to work these types of problems
- Read over or do the old exams
- Exam will mostly be quantitative, focused on the optimality conditions and their use to make decisions on input(s)/output
- Expect more on the special topics lectures than in years past
- Email/call me with questions, we can meet in my office if needed