How to Survive a Math/Proof-Heavy Exam

Ron Parr
CPS 271

Basic Assumption

• Prof intended exam to be doable in exam time
• Implications:
  – Most or all problems should have simple answers
  – Spend more time thinking, less time writing
  – Focus on the big picture
• Ask yourself:
  – What is the basic insight behind the question?
  – What is shortest path to demonstrate this insight?

Prepare Yourself Mentally

• Don’t panic!
• Read all questions carefully
• Ask for clarification if needed
  (prof takes no pleasure in tricking/confusing you)
• Don’t panic!
• Start answering easiest questions first
  – Reread question before you start writing
  – Reread question after you are done to make sure you
    have answered the question
• Don’t panic!

How to Attack Proofs

• Consider options before you start writing
• Frontal assault (direct/algebraic proof)
  – Usually the easiest to start
  – Often requires more algebra/calculation/writing
• Induction
  – Requires more subtle thinking
  – Can sometimes lead to shorter/more elegant proofs
  – Doesn’t always work out
• Sneak attack (proof by contradiction)
  – Requires more planning at first
  – Can lead to very, very short proofs

How to Find Examples/Counterexamples

• Develop intuition about what you want to show
• Try to find a low dimensional example (Don’t waste time
  dealing with 3,4,5,... dimensions if 1 or 2 will suffice.)
• Consider boundary and degenerate cases
  (remember assumption that exam should be doable)
  – Consider -1,0,1
  – Consider making variables equal
  – (Even if these don’t work, they help give you insight into
    what will work)
• The smaller the example, the easier it is to write up,
  and the more time you have for the next problem

Check Your Answers

• Did you answer the question?
• Have you proved both directions of biconditionals?
• Are all of your probabilities between 0 and 1?
• Are all of your probability densities non-negative?
• Do they integrate to 1?

• Plug in some trivial cases (0,1,etc.) to make sure
  your answer makes sense
• Check matrix dimensions
Other Tips

- Don’t panic!
- Use a pencil
- Challenge yourself while studying:
  - Studying ≠ memorization
  - Exam questions ≠ homework questions with different numbers
  - Do I understand the boundary conditions?
  - How does one method differ from another?
  - What are the pros and cons?
- Don’t panic!

Why This Matters

- Wait a minute... I thought grades didn’t matter (much) in graduate school!

- True, but
  - Understanding matters
  - Learning to communicate your understanding in a succinct manner really, really matters