Problem Statement

- Description of problem
- Why a solution to this problem is important
- Who are the stakeholders/actors
- What are the existing solutions
- Description of your solution
- Why your solution is going to be better than existing solutions
  - Existing solutions may not be computerized
- 3 points for first and fifth items, 1 for each of the rest

Software Engineering

COEN 174

Ron Danielson

Systems

Chapter 2

Objectives

- Understand size and complexity issues of systems
- Know how to develop and support a system
- Appreciate the coordination needs of system development and support

Programs vs. Systems

- More complexity in systems
  - Due to **breadth** (number or variety of components)
  - Due to **depth** (complexity and relationships among components)

Breadth

- Functionality
- Features within each function
- Interfaces
  - Internal and external
- Number and complexity of data types and data structures, as well as volume of data
- Users (and variety of users)
  - Example: international language support

Depth

- Linkages and connections
- More
  - Frameworks
  - Libraries
  - Layers
  - Data sharing across functionality
  - Control passing between functionality
- Can lead to more reuse and reusability, but also greater complexity

Dealing with Complexity

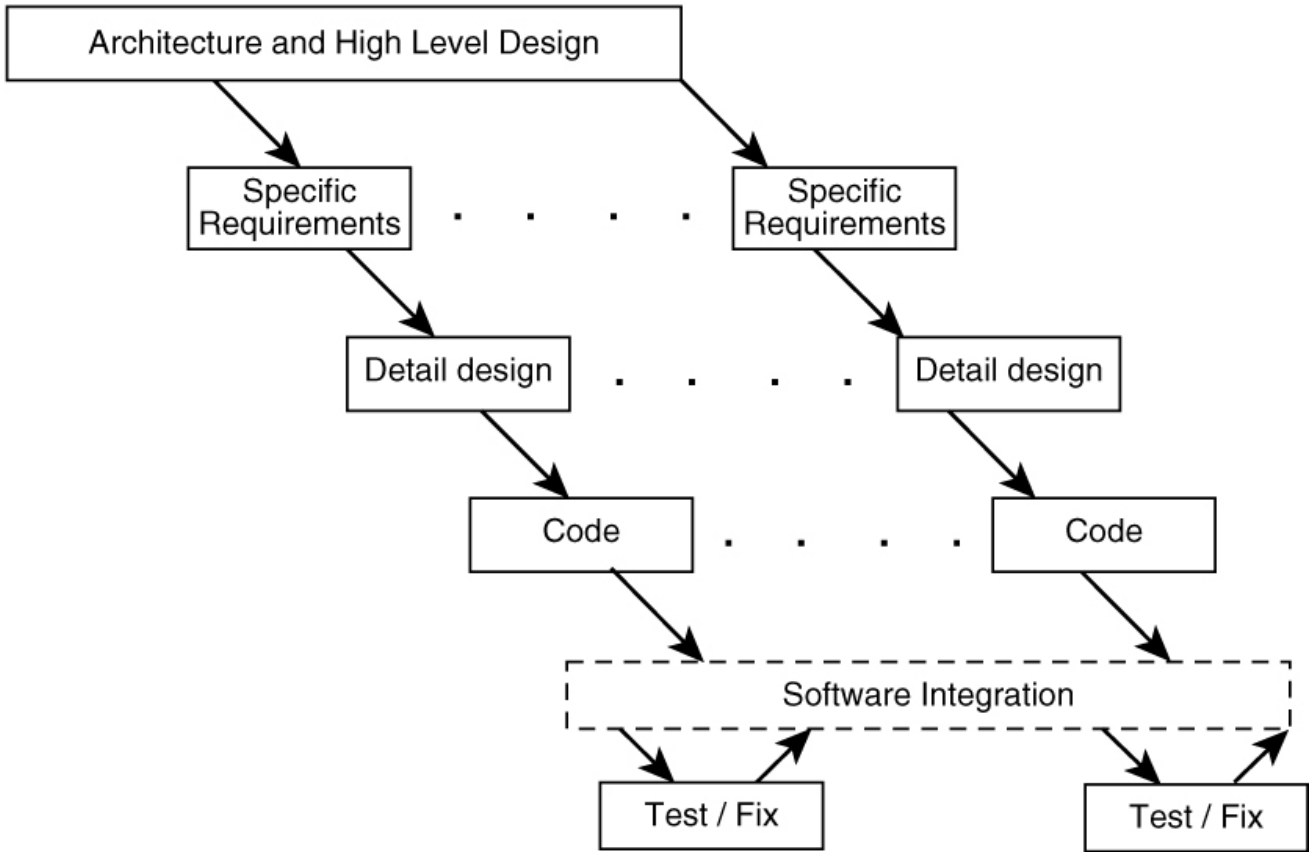
- Improve processes and methodologies
  - Improved coordination of
    - People
    - Tasks
  - Overlap tasks
    - Clarify dependencies
  - Measure different artifacts and outcomes to clarify relative progress

Software [Development] Processes

- A **SD process** is a framework or methodology for implementing a system
- Process specifies
  - A set of tasks to perform
  - Relative timing of each of the tasks
  - The inputs and outputs of those tasks
  - Pre- and post-conditions for each of the tasks

Software Develop Plan (SDP)

Understanding the Broad Problem (Req.)



Technical Considerations

- Simplification
  - Decomposition of problem and solution
  - Modularization
  - Separation of concerns of problem and solution
  - Incremental interations
- **Loose coupling, high cohesion**

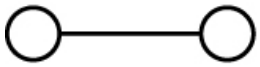
Technical Considerations (cont.)

- Technology and tools
  - Platform
  - Programming language
  - Database
  - Network infrastructure
  - Configuration management system
  - Techniques for modeling problem and solutions
  - Version control and build
    - Automated testing, change control

Non-technical Considerations

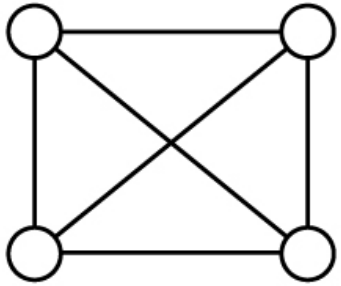
- Effort estimation becomes much more important
- Coordination of people and resources
  - Clarity about assignments
  - Relative timing and dependencies
- Resource allocation becomes essential
  - Skill distribution among implementers
  - Requires more discriminating knowledge of staff
- Support and training

Non-technical Considerations (cont.)



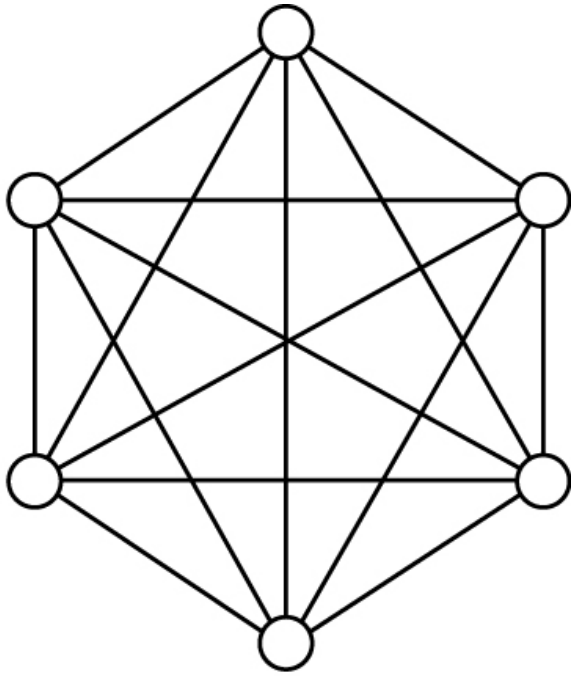
2 people:

1 path



4 people:

possibly 6 paths



6 people:

increase to potentially 15 paths

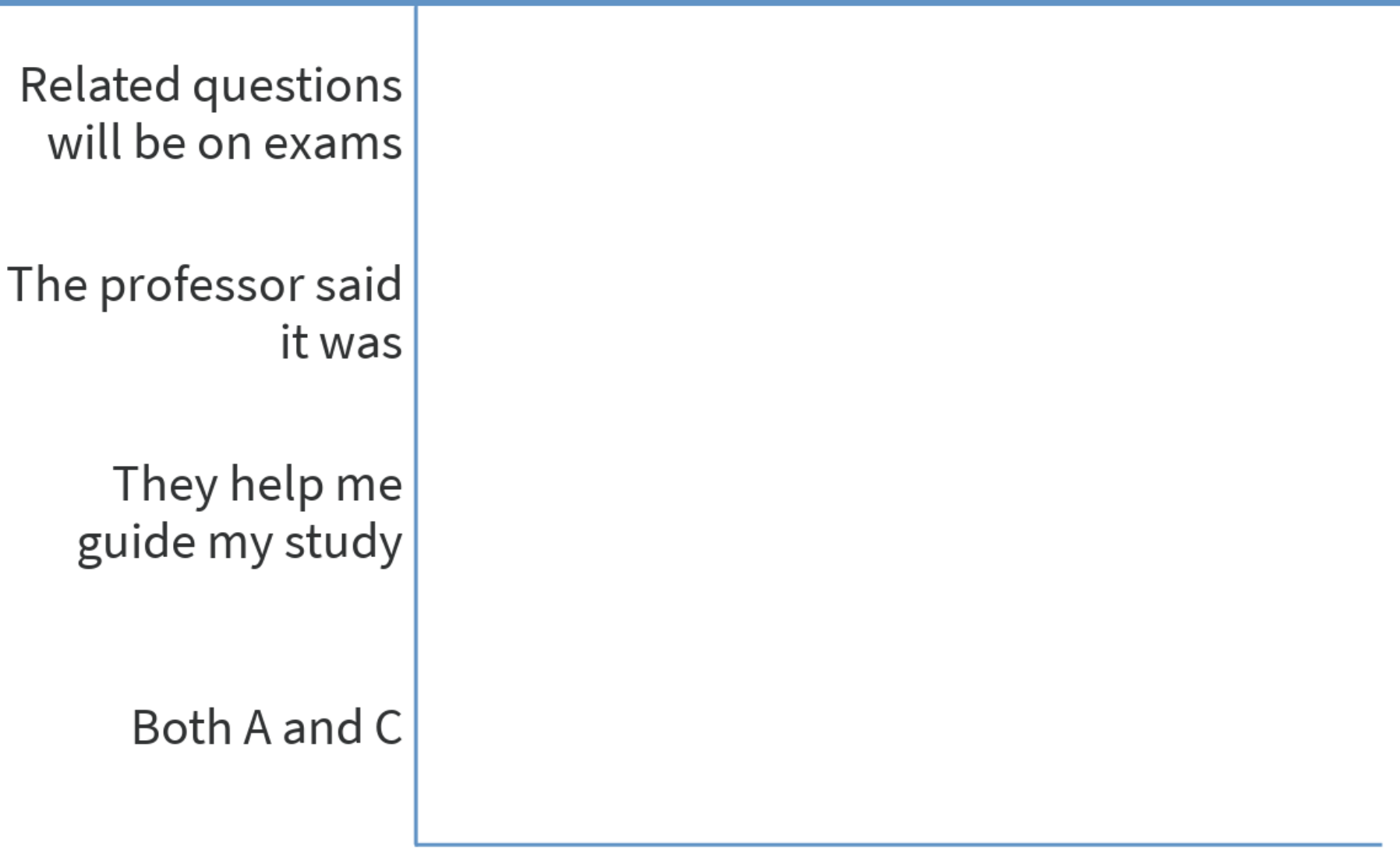
Non-technical Considerations (cont.)

- Recommendation for project – designate leads
  - Client
  - Design
  - Implementation or coding
  - Test
  - documentation

Sample Multiple Choice Questions

- **ALWAYS** choose the **ONE BEST** answer

Knowing the course learning outcomes is important because



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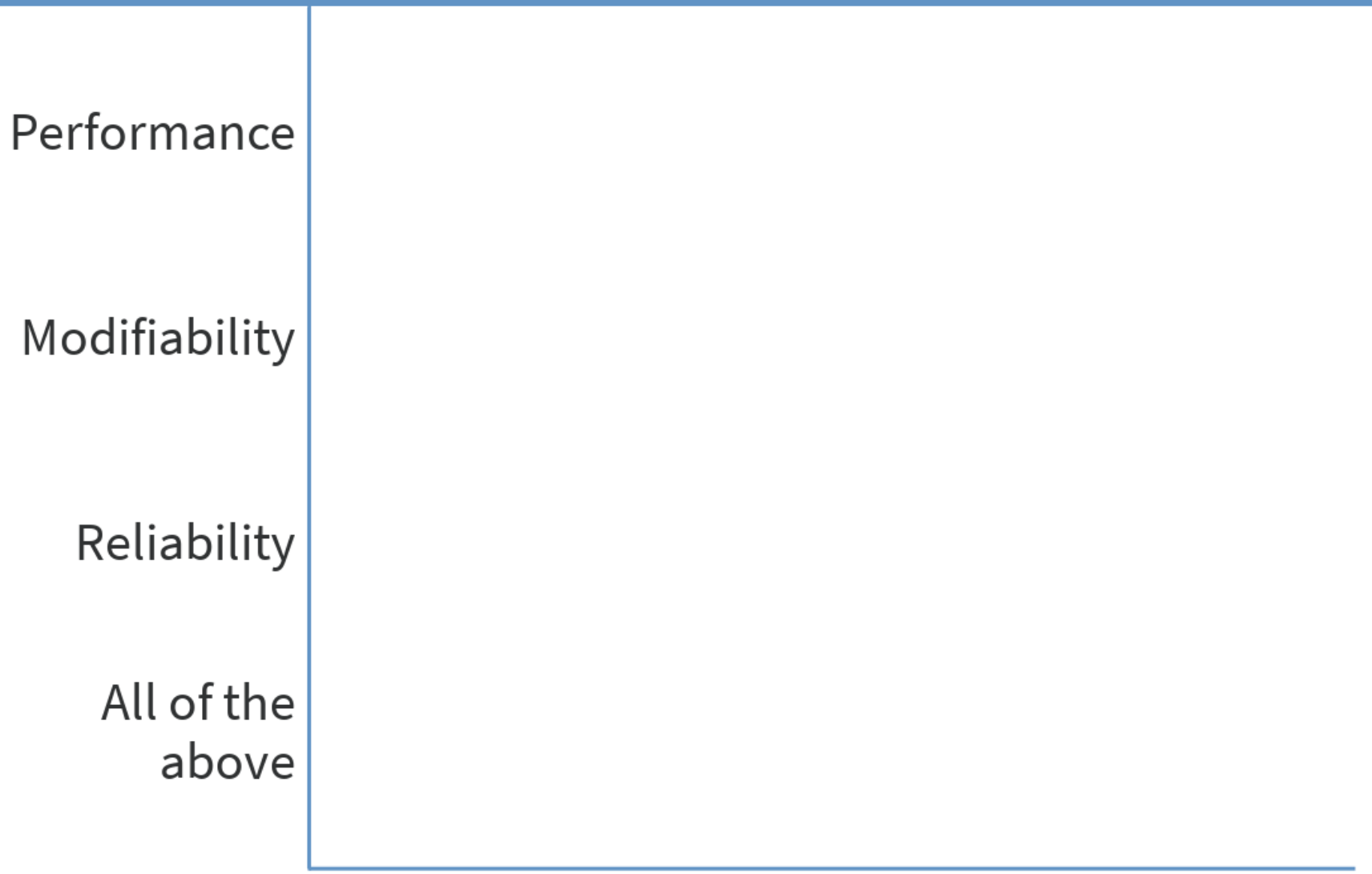
Examples of nonfunctional requirements are



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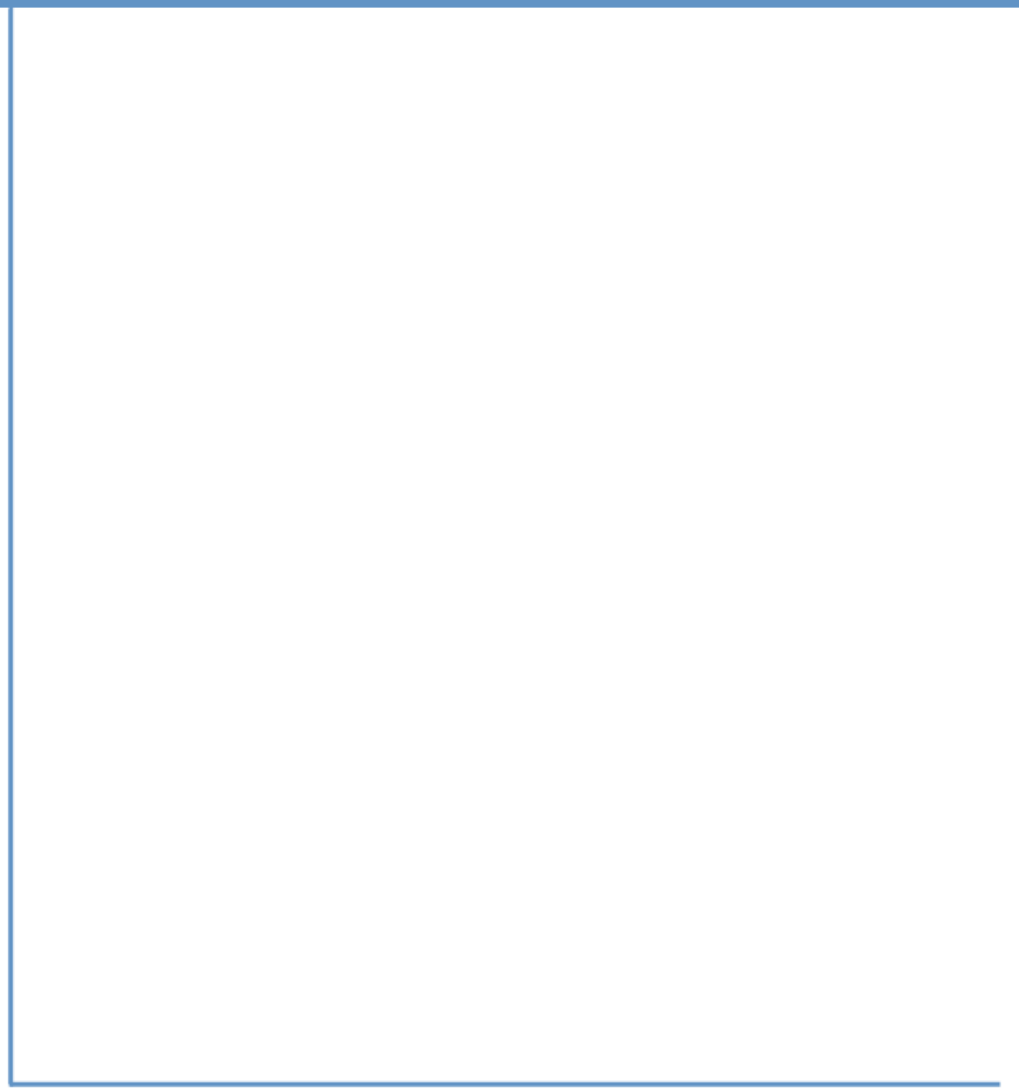
A software development process specifies

How the system will meet the client's needs

A set of tasks to perform to create software

The organizational structure for software development

Both B and C



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Coupling refers to

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Connections between modules in a system

Something that holds train cars together

A measure of module independence

Both A and C

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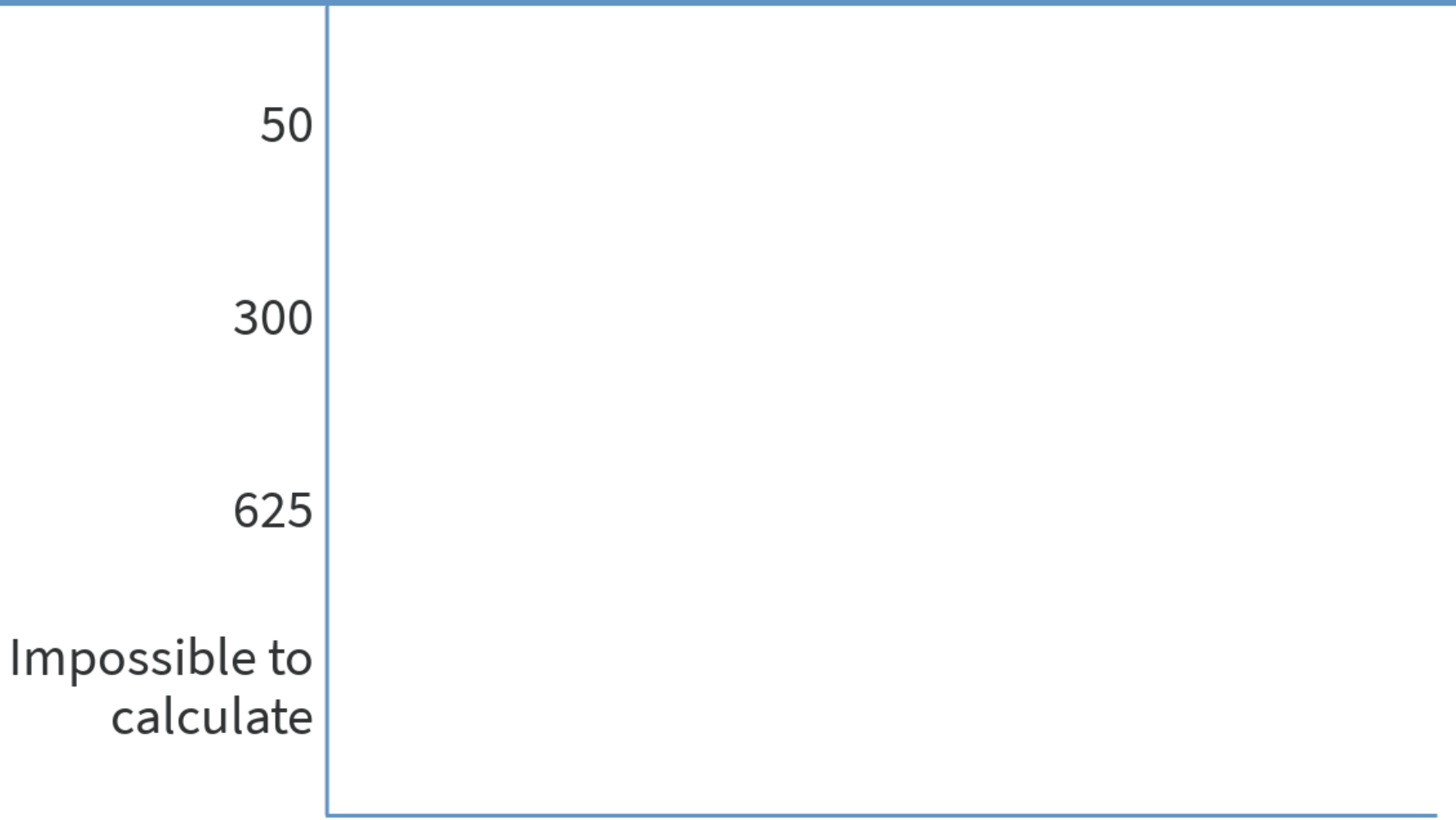
The maximum number of communication paths between a team of 25 people is



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