# CIS 343 – Midterm

## Instructions

Put your name on this sheet. Print it neatly; nearly ever test I have multiple exams for which I can’t read the name (and I used to be a special education teacher who has worked with kids with writing disabilities – and I still can’t read some of your names!). Many of you will either stop reading here or will not bother reading the instructions at all. Be rather quiet when you read the next sentence. For that reason, putting your name on this paper with the name of your favorite superhero as your middle name will automatically give you three points on this exam. After all, half of being good at our field is reading the documentation. This sentence is merely here to help hide the above information. Some questions are multi-part; be careful you are answering all questions fully.

## Exam

1. Define and explain the difference between **syntax** and **semantics** (5 points).
2. Describe the process by which we create a new language, starting with arbitrary symbols and going to meaning (7 points).
3. Given this context-free grammar, answer the following questions:  
     
   **<Ω> → Π <**♣**> Θ  
    ;  
   <**♣**> → <**Δ**>  
    | <**Δ**> <**♣> **;  
   <**Δ**> → <ϒ> = <⇔>  
    ;  
   <ϒ> → Α   
    | Β   
    | Χ  
    ;  
   <⇔> → <ϒ> + <ϒ>  
    | <ϒ> - <ϒ>  
    | <ϒ>  
    ;**  
     
   a. Using left-most derivations, attempt to derive the following sentences (22 points):  
     
     
   **Π Β = Β - ΑΘ**  
     
   **Π Β = ΒΒ - ΑΘ**

b. Are either of the sentences valid for the language? If so, which one(s) and why (5 points)?

1. Explain the differences between **operator precedence** and **associativity** (5 points).
2. Define the following, as they pertain to **type systems.** Give examples (12 points).  
     
   **dynamic:  
     
     
     
     
     
     
   static:  
     
     
     
     
     
     
   implicit:  
     
     
     
     
     
   explicit:  
     
     
     
     
     
     
   weak:  
     
     
     
     
     
     
   strong:**
3. Of the above six terms, which ones would you use to describe the C language, and why (3 points)?
4. How many bytes is a **char** in C? Explain how you know this (5 points).
5. Name and define the four **programming paradigms** we have for communicating with computers (8 points).
6. What/Who was (8 points):  
     
   a. The (generally accepted) first compiled programming language?  
     
     
     
     
     
   b. The first functional language?  
     
     
     
     
     
   c. The language that had a great deal of impact on the field but was mostly just used in European countries?  
     
     
     
     
     
     
   d. The language that was created by the Department of Defense for **business**?
7. What problem was Java’s creation an attempt to solve? In other words, what was the primary reason we needed a language like Java (5 points)?
8. What are the six attributes we use to resolve variables? List and define them (15 points).