# CIS 343 Final Exam – Fall 2018

## Instructions

1. Put your name on this exam.
2. Answer all questions completely; do not merely list the answer(s).
3. Remember this is just a way to show me what you’ve learned. It is possible to get a poor grade, but not likely to hurt you in any significant aspect of life.
4. The exam has 110 points, meaning you can skip 10 points and still get 100. I will not award 110, but if you answer more than you need to I will allow any points you gain to count toward the 100. If you finish the online portion of the exam you can skip another 10 points.

## Exam

1. Define and give an example of Context and Abstraction as the concepts pertain to programming languages. (10 points)
2. Define syntax and semantics in the context of programming languages. (10 points)
3. Given the language:  
     
   <program> -> begin <stmt\_list> end

<stmt\_list> -> <stmt>

| <stmt> ; <stmt\_list>

<stmt> -> <var> = <expression>

<var> -> A | B | C

<expression> -> <var> + <var>

| <var> - <var>

| <var>

Show whether or not “begin A = B + C ; B = C end” is a valid sentence. Use the left-most derivation method and SHOW EVERY STEP. (10 points)

1. In Python write a list comprehension that returns a list of the numbers 1-20 squared. Point only awarded for a list comprehension. (10 points)
2. In Python both lists and tuples are sequence types. What is the primary difference between them? (5 points)
3. Describe Python’s variable mangling abilities. Does this give Python private variables? (10 points)
4. Grand Valley has G numbers and P numbers (P numbers are for prospective students). Each of these identifiers begins with one of those two letters, followed by eight numbers. Write a regex that describes this token. (5 points)
5. Given the tokens INT (an integer), FLOAT (a floating point number), and the operators + and -, write a context free grammar that can generate a language that ignores whitespace and parses an arbitrary number of addition and subtraction statements. Each statement must be on its own line. (20 points)
6. Is operator overloading good or bad in terms of readability and writability? (8 points)
7. What are the differences between **let** and **var** in Javascript? (2 points)
8. Describe the difference between prototype inheritance and classical inheritance. (10 points)
9. Write a function in Scheme (or another primarily functional language) that returns the last element of a list. (10 points)

**Extra Credit**

What is your favorite programming language?