

COS 301 Programming Languages
Fall 2011
Project Assignment #5 Due Thursday Dec 8

Functions and Conclusion

For this assignment, submit the paper with your graded first draft of Paper 1 or Paper 2 that received the lowest grade! There will no rewrite cycle and your grade will be partly based on the degree of improvement shown since the start of the semester.

Write a 6-to-8 page paper that discusses functions and parameter passing, and then provides overall conclusions concerning the language of interest

Topics addressed under functions and parameter passing should include function call syntax, function definition syntax, parameter passing conventions, scope of defined functions, ability to pass functions as parameters, and support for recursion.

Finish the paper with an overall evaluation of the strengths and weaknesses of your selected language. This discussion may be within the context of specific problem domains. For example, APL is a very strong language for matrix applications but is almost completely useless for web programming. There would be little point in discussing the language either as a general purpose programming tool or as a web application tool.

Programming Assignment #5

Create a class or an abstract data type that performs rational arithmetic. You should implement addition, subtraction, multiplication and division, as well as tests for equality, inequality, less than, greater than. Additional operations might include conversions to decimal form, ToString, FromString, FromDecimal conversions, and a CanonicalForm which would return 1 / 2 for 2/4, 3/6, 57/114, 20111/40222, etc. Note that you can obtain this form by computing the GCD using Euclid's algorithm:

$$\text{gcd}(a,0) = a$$

$$\text{gcd}(a,b) = \text{gcd}(b, a \bmod b)$$

Submit the output from evaluating these expression

```
1/2 * 1/3
27/43 - 43/127
1/3 + 1/6 + 3/9 + 2/12
1/17 + 117/191
4/17 ÷ 11/13
9/11 - 4/17
1/8 * -1/20000
3/11 == 9/33
3/11 < 1/4
```

Additional test data

```
4/5 > FromDecimal(0.8000001)
Canonical Form (111/7868679)
ToDecimal(289374/394857)
```