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final2010 - CIS 425 Final Exam Fall 2010 Your Name 1 1 ML...

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CIS 425 : Final Exam – Fall 2010

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## 1 ML - 14 points

What do the following ML expressions evaluate to:

```
let fun f x = x+x
in f 7
end
```

```
let fun f x = x+x
    val x = 3
in f 7
end
```

```
let val x = 3
    fun f x = x+x
in f 7
end
```

```
let val x = 3
    fun f y = x+y
in f 7
end
```

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```
let val x = 3
    fun f y = x+y
in let val x = 5
    in f 7
    end
end
```

```
let val g = let val x = 3
              fun f y = x+y
              in f
              end
in let val x = 5
    in g 7
    end
end
```

```
let val x = 3
    fun f y = x+y
in let val x = 4
    fun g h = h (h 7)
    in g f
    end
end
```

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## 2 Parameter Passing (9 points)

In the presence of side-effects, the choice of parameter-passing technique can have non-trivial consequences. To see this, consider the following ML expression:

```
val y = ref 1;  
fun f x = (!y) + (x + x);  
(f (y := (!y)+1; !y)) + (!y);
```

For each of the following parameter passing conventions, indicate the final value computed by this program. (You may assume that  $+$  is left-associative.)

1. [3] call-by-value

```
val it =
```

2. [3] call-by-name

```
val it =
```

3. [3] call-by-need

```
val it =
```

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### 3 CPS - tail recursion - 10 points

Convert the function preorder to CPS. Do not convert the functions `::` (cons)

`preorder :: Tree -> [a]`

`preorder =`

`let rec go :: Tree -> [a] -> [a]`

`in go (preorder go) []`

`go (Node v l r) acc = v :> go l acc >> go r acc`

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**6. Monads in ML, 12 Points**

Given the following datatype for monads:

$$\text{datatype monad} = \text{B of bool} \mid \text{C of 'a} \mid \text{D of 'a} \mid \text{E of 'a}$$

- Write a function `getBool` in ML that generates a monad in which every element is a `bool`, i.e., generates the monad that represents an infinite sequence of booleans.

- Write a function `concat` in ML that takes two monads of `bool` and `bool` and produces a monad `monad` such that the ML element is `bool` is the value of the ML element is `bool` and `bool`.

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TERM	PROFESSOR	TAGS
Fall '08	Staff	Control flow, Evaluation strategy, val y, val G

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let fun f x = x in f 7 end

1. Evaluate

2. Follow syntax and type

3. Strongly typed

let fun f x = x in f 7 end

Follow syntax and type

Follow function that prints on string

let print "hello, world!"

let fun f x = x in f 7 end

Follow syntax and type

Follow function that prints on string

let print "hello, world!"

hello, world

let fun f x = x in f 7 end

Follow syntax and type

Follow function that prints on string

let print "hello, world!"

hello, world

let fun f x = x in f 7 end

Follow syntax and type

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let print "hello, world!"

hello, world

let fun f x = x in f 7 end

Follow syntax and type

Follow function that prints on string

let print "hello, world!"

hello, world

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CIS 425 Spring 2010  
 Student ID: 123456789  
 Date: Monday, April 24, 2010 1:10pm

### Goals

By the end of this assignment, you will have:

- started programming with Python modules (turtle, turtle)
- practiced importing functions in Python modules
- practiced with Python graphical output (turtle module)
- achieved understanding of a tricky concept: return vs. print
- had more practice with drawings and good programming style
- written multi-function programs

### 100: Drawing a Square with Turtle

Remember to include "import turtle" at the top of your Python file (in the editor window).

(100) Write a function square to draw a square using turtle movement commands (e.g., fd, bk, lt, rt). The function square should have one parameter: length, which is the length of the sides of the square. Square will not return any value. The function square:

```
=== square(100)
=== square(100)
```

(100) Write a function square by adding a second parameter: color. The function should now draw an outer-colored square.

Some turtle functions that will be helpful: fd, bk, lt, rt, and goto. When fd, bk, lt, or rt is called, the turtle keeps track of its starting point, and at the time it has moved (fd, bk, lt, or rt) is called, the turtle moves to the new point. The turtle's position is the point (x, y) in the space defined by the lines that the turtle has drawn. The turtle's color function and up and down functions may also be useful. Explore the functions using their help function or using the Python documentation.

The function square with whatever arguments you like, for example:

```
=== square(100, "red")
=== square(100, "red")
```

(100) Write a function triangle with two parameters: length and color, which will draw a color-colored triangle when called. Triangle will not return any value.

```
=== triangle(100, "orange")
=== triangle(100, "orange")
```

(100) In square, the turtle will need to move 300 degrees to complete the triangle and return to its initial heading. In square, the turtle's initial heading for a triangle will be down.

project4

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project4

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**CIS 122 Spring 2015**  
**Project 1: Hello Python**  
**Due: Monday, April 6, 4p**

**Goals**

By the end of this assignment, you should:

- be able to open, edit, and save with the Python Shell window
- understand how Python evaluates simple expressions
- be familiar with Python's basic operators
- understand Python assignment statements
- be able to write and execute simple Python code to solve a problem

**Grading Rubric**

This project will be marked out of 14 points, with points given for both problem solving and Python code.

**Getting Started**

For this project you will be using the **Python Shell** window in our course. Features of **Shell**, in particular the **Python Shell** and **Python Editor**, will be introduced in lecture week.

For this project you will also explore Python code and other resources in the standard **Python Shell** in the Python Editor window. Before starting each problem, type command in the Python Editor, e.g.

**# Problem 1**

The **#** symbol with Python ignores everything that comes after the **#** for that line.

**Finishing & Submitting your work**

When you have completed all of the problems and the have reviewed them the **Python Editor** will save the Editor window as a file with the name **cis122project1.py**.

To submit your project, login to Blackboard.

From the menu on the left hand side of the course, choose **Project 1** in the project list. Choose **Submit Hello Python** in the list of things that are displayed, and then to **Submit File** and choose **Browser My Computer**. Locate **cis122project1.py** (the file you just created) and highlight it. The file name will appear under **Submit File** (which you will use). (You need not open or submit your work from the Python Shell.)

At the bottom of **Project 1**, you will see **Comments** window. This is where you provide all of the answers of any help you may have received in this assignment, including your point of view on writing in a programming language. This is also the place to include any feedback you may have about this assignment and/or any remaining questions you may have.

Good luck on **Project 1** and the **Editor** button. You may re-submit your project up until the project deadline (the final submission will be graded).

To run the code save the Editor window to a file named **cis122project1.py** From  
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5 pages

CIS 425 Spring 2010  
 Project 1: ML in Python - Part 1  
 Due: Monday, April 19, 2010

#### Goals

By the end of this assignment, you should:

- 1. be able to open ML4 and work with the Python shell
- 1. understand how Python evaluates simple expressions
- 1. be familiar with Python's control operators
- 1. understand Python assignment statements
- 1. be able to write simple Python code to solve a problem

#### Grading Rubric

This project will be worth a total of 14 points, with 10 points given for solving statements and expressions in the Python shell, and 4 points for solving problems (7).

#### Solving Statements

This project asks for Python shell for every problem. Before pasting each problem, please comment into the Python shell:

```
--- 4 Problems ---
```

The "!" symbolically Python to ignore everything that comes after the line.

#### Submitting & Submitting your work

When you have completed all of the problems, go to the form contained from the file menu to generate shell as a file with the name: myproject1

To submit your project, login to Blackboard

From the menu on the left hand side of the screen, choose "Projects" in the project list, choose "Submit My Project - Part 1", in the list of the pages that is displayed, click down to "Submit to" and choose "Submit My Project". Under "Assignment" give the project credits and deadline as 1. The file name will appear as an "Attached File" but that you will get.

At the bottom of section 1, you will get a "Comments" window. This is where you submit all of the sources of any help you may have received on this assignment, including your partner. If you are working in a programming pair. This is also the place to include any feedback you may have about the assignment and/or any remaining questions you may have.

Good luck on section 1 (submit the "Submit" button. You may re-submit your project up until the project deadline. Only the final submission will be graded.

project1

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project1



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CIS 122 Spring 2010  
Question 5Answer  100%

(1) What are the values of `x` and `y` after the following code is compiled into the Python shell?

```

x = 10
x = x + 2
x = 10
x = 10

```

a) 10, 10    b) 11, 10, 10    c) 10, 10, 10    d) none of the above

(2) Given the following Python code:

```

def foo (greeting, name):
    "What does this function do?"

    print(greeting, name)
    result1 = foo(greeting)
    result2 = foo(name)
    final_result = result1 + result2
    return final_result

```

```

foo(foo(foo("hello", "CIS 122")))

```

What will be displayed in the Python shell?

a) `helloCISCISC`    b) `greeting name`    c) `helloCISC 122`    d) `greeting name`  
☐ a    ☐ b    ☐ c    ☐ d

(3) Given

```

x = 10
y = 10 + 2
z = 10 * 2

```

The expression `(x + y) * z` will evaluate to

a) 100    b) 1000    c) None    d) none of these

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