CS 421 --- Variables and Parameters

Manager	Keeps team on track	
Recorder	Records decisions	
Reporter	Reports to class	
Reflector	Assesses team performance	

Eager Parameter Passing Styles

Consider the following code block. The language is EVIL HASKELL, where variables assignments are allowed.

```
0 i = 10
1
2 foo a =
3   a := 50 + i
4   a := a + i
5   i
6
7 main = do print (f i)
8            print i
```

	Style 1	**Style 2**	**Style 3**
Line 7 Result	10	120	10
Line 8 Result	10	120	70

Problem 1) What are the parameter passing styles of each of these?

Problem 2) Fill in the memory diagram to show how the final values were obtained.

Style 1

Line	Value of a	Value of i
0,7		
2		
3		
4		
8		

Style 2

Line	Value of a	Value of i
0,7		
2		
3		
4		
8		

Style 3

Line	Value of a	Value of i
0,7		
2		
3		
4		
8		

Lazy Parameter Passing Styles

Consider the following code block.

```
0 foo x y = x + x + x
1
2 main = foo (bar 10) (baz 20)
```

Assuming that `bar` and `baz` are not recursive, how many times do they get called for each of the following parameter passing styles?

Problem 3) Call By Value

Problem 4) Call By Name

Problem 5) Call By Need

Problem 6) Suppose `baz 20` had a bug that caused an infinite loop. Which of these styles would still be safe?

Problem 7) Call by Need is more optimal than Call by Value, but Call by Value is used far more often in programming languages. Why do you think that is the case?

Binding

Consider this C++ code,

```
int foo() {
  int i;
  int a[10];
  int b[10];

  for(i=0; i<=10; i++) {
     b[i] = 10 + i;
     a[i] = 0;
  }
  return b[0];
}

int main() {
   printf ("Foo returned: %d\n",foo());
}
```

Problem 8) What does this code do print out? Hint: this is a trick question.

Consider the following evaluator code snippet.

```
eval (SExp (x:xs)) env =
  let fun = eval x env
      args = [eval y env | y <- xs]
  in case fun of
    Closure params body cloenv -> eval body ((zip params args) ++ cloenv)
```

Problem 9) What parameter passing style does it implement?

Problem 10) What should we change if we want it to use call-by-name instead?

Variables and Parameters --- Team's Assessment (SII)

Manager or Reflector: Consider the objectives of this activity and your team's experience with it, and then answer the following questions after consulting with your team.

1. What was a **strength** of this activity? List one aspect that helped it achieve its purpose.

2. What is one things we could do to **improve** this activity to make it more effective?

3. What **insights** did you have about the activity, either the content or at the meta level?

Variables and Parameters--- Reflector's Report

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1. What was a strength of your team's performance for this activity?

2. What could you do next time to increase your team's performance?

3. What insights did you have about the activity or your team's interaction today?