

Compilers and Languages class test 2

Write your name and secondary ID (of the form abc123) on the top right corner of all your answer sheets.

Question 1 Would it always be possible to have exactly one stack frame for each *function*, or not? Explain which programming language feature is most relevant to this situation.

[10%]

Question 2 Suppose we consistently rename the formal parameters of a function. For example, we could rewrite

```
int f(int x) { return x * x; }
```

into

```
int f(int y) { return y * y; }
```

Does such renaming change the compiled code? Explain your answer.

[20%]

Question 3 Is it always possible to keep a variable in a register, or are there situations where it must be kept in the stack frame? Explain your answer.

[30%]

Question 4 Consider the following expression:

$$(\lambda f. (\lambda x. f)) (\lambda z. z)$$

Show how the CEK machine evaluates the expression. Explain which closures are formed.

[40%]