

Homework 5 - Extend

* If there is any problem, please contact TA.

Name: _____ Student ID: _____ Email: _____

Problem 1. (30 points) Consider the following program which is written in C syntax.

```
int x = 1;

void f1() {
  int x = 2;
  f2();
  printf(x)
}

void f2() {
  int x = 3;
  printf(x)
}

int main() {
  f1();
  printf(x)
}
```

(a) What will be printed after running `main()` when it uses static scoping? dynamic scoping?

Problem 2. (40 points) Extend tuples to records, and write the (a) syntax and (b) semantic rules for records. Example usage:

- Elements are indexed by labels:
 - $\{y = 10\}$
 - $\{id = 1, salary = 50000, active = \mathbf{true}\}$
- The order of the record fields is insignificant:
 - $\{y = 10, x = 5\}$ is the same as $\{x = 5, y = 10\}$
- To access fields of a record:
 - $a.id$
 - $b.salary$

Problem 3. (30 points) Another way of defining **let** as derived form might be to desugar it by "executing" it immediately-i.e., to regard **Let $x=t_1$ in t_2** as an abbreviation for the substituted body $t_2[t_1/x]$. Is this a good idea ?

Remark: You need to use **LaTeX** to write your homework and **convert it into .pdf** file. Please upload both **.tex and .pdf** files on **Canvas**.

File name format: **HW_X_Name_StudentID.tex/HW_X_Name_StudentID.pdf**