

CSE 3302/5307 Programming Language Concepts

Homework 5 - Spring 2026

Due Date: Feb. 23, 2026, 11:59 PM

Problem 1 - 30%

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%

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%

Evaluate the following expressions and show all steps.

- (1) $(\lambda x : \text{int} * \text{int}.x.1)\{\text{if } 1 < 2 \text{ then } 5 \text{ else } 6, 3 + 1\}$
- (2) $(\lambda p : \text{int} * \text{int}.\text{if } p.1 > p.2 \text{ then } p.1 \text{ else } p.2)\{2 + 3, \text{succ } 4\}$
- (3) $(\lambda p : \text{int} * \text{int}.p.2)\{3 + 1, (\lambda x : \text{int}.x + 1) 4\}$

Submission Format: Submit only the **.pdf** version of your homework (typed submissions are preferred; Scanned images must be readable). File must be named **lastname_studentID_hw5.pdf**.