

## Quiz 4

STUDENT NAME

### Q1

6 Points

Consider the following Grammar:

$$S \rightarrow S \wedge S | S \vee S | \sim S | T$$

$$T \rightarrow true | false | a | b | c$$

#### Q1.1 Grammars

2 Points

Show each step of any valid derivation of

$$false \vee true \wedge \sim false$$

Save Answer

#### Q1.2

4 Points

Rewrite the grammar so that is not ambiguous and that the precedence is as follows:  $\sim$ ,  $\wedge$ ,  $\vee$

Save Answer

## Q2 Parsing

8 Points

Assume you have the following tokens:

```
type tok = Int of int | Plus | Sub
```

Assume you have the following AST type:

```
type ast = Num of int
          | Add of ast * ast
          | Minus of ast * ast
```

$S \Rightarrow NS + | NS - | N$

$N \Rightarrow n$ , where  $n$  is a number

Using the following grammar, write a parser for `parse_s`

```
let lookahead lst = match lst with
  [] -> failwith "error"
  h::t -> h;;

let match_tok lst tok = match toks with
  | h::t when h = tok -> t
  | _ -> failwith "error"

let parse_N toklst = match toklst with
  Int(x)::t -> (Num(x),t)
  | _ -> failwith "error"

and rec parse_S toklst =
```

Enter your answer here

Save Answer

## Q3 OpSem

Consider the following OpSem Rules:

$$\frac{}{A; \text{true} \Rightarrow \text{true}} \quad \frac{}{A; \text{false} \Rightarrow \text{false}}$$

$$\frac{A; e_1 \Rightarrow \text{true}}{A; (\text{not } e_1) \Rightarrow \text{false}} \quad \frac{A; e_1 \Rightarrow \text{false}}{A; (\text{not } e_1) \Rightarrow \text{true}}$$

$$\frac{A; e_1 \Rightarrow \text{true} \quad A; e_2 \Rightarrow v_1}{A; (\text{if } e_1 \text{ then } e_2 \text{ else } e_3) \Rightarrow v_1}$$

$$\frac{A; e_1 \Rightarrow \text{false} \quad A; e_3 \Rightarrow v_1}{A; (\text{if } e_1 \text{ then } e_2 \text{ else } e_3) \Rightarrow v_1}$$

$$\frac{A; e_1 \Rightarrow v_1 \quad A; e_2 \Rightarrow v_2 \quad v_3 \text{ is } v_1 \parallel v_2}{A; (e_1 \parallel e_2) \Rightarrow v_3}$$

Fill in the following derivation:

$$\frac{\frac{A; \#3 \Rightarrow \#3}{A; \#1 \Rightarrow \#5} \quad \frac{A; \#4 \Rightarrow \#4}{A; \#2 \Rightarrow \#2} \quad \#5 \text{ is } \#1}{\text{if } \textit{true} \parallel \textit{false} \text{ then } \textit{true} \text{ else } \textit{not } \textit{false} \Rightarrow \#6}$$

**Blank #1:**

Enter your answer here

**Blank #2:**

Enter your answer here

**Blank #3:**

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**Blank #4:**

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