Discussion 10 Worksheet

1. [8 pts] Using the rules given below, show: A; let x = 3 in let x = 5 in let z = x + 4 in z + 1 $\Rightarrow$ 10

$$\frac{}{A;\ n \Rightarrow n} \qquad \frac{A(x) = v}{A;\ x \Rightarrow v}$$

$$\frac{A; e_1 \Rightarrow v_1 \quad A, x : v_1;\ e_2 \Rightarrow v_2}{A;\ \textbf{let}\ x = e_1 \textbf{in}\ e_2 \Rightarrow v_2} \qquad \frac{A;\ e_1 \Rightarrow n_1 \quad A;\ e_2 \Rightarrow n_2 \quad n_3\ is\ n_1 + n_2}{A;\ e_1 + e_2 \Rightarrow n_3}$$

2. [6 pts] Write a context-free grammar (CFG) that accepts the same language of strings described by:

$$a^m b^n c^{3n}$$

where $m \geq 1, n \geq 0$

3. [6 pts] Given the following grammar, complete the parse functions. *lookahead* and *match_tok* are given.

$S \rightarrow \mathbf{a}\, S\, \mathbf{b} \mid T\, \mathbf{b}$

$T \rightarrow \mathbf{c}\, T \mid \mathbf{c} \mid U$

$U \rightarrow \mathbf{d} \mid \mathbf{f} \mid$ ***e (emtpy string)***

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let lookahead () : string =
match !tok_list with
| [] ->  raise (ParseError "no tokens")
| h::t -> h

let match_tok (a : string) : unit =
match !tok_list with
| h::t when a = h -> tok_list := t
| _ -> raise (ParseError "bad match")
```

let rec parse_S () =

and rec parse_U () =

and rec parse_T () =