

Written Assignment - III

Q1

a)

$M_b(\langle \text{expr} \rangle, s) \triangleq$

case $\langle \text{expr} \rangle$ of
 $\langle \text{boolean_val} \rangle \Rightarrow$
then $\langle \text{expr} \rangle$

$\langle \text{bool_expr} \rangle \Rightarrow$

if ($\langle \text{left_expr} \rangle == \text{undef}$ || $\langle \text{right_expr} \rangle ==$
 undef)
then error

if ($\langle \text{oprt} \rangle == "||"$) then

$M_b(\langle \text{left_expr} \rangle, s) || M_b(\langle \text{right_expr} \rangle, s)$

else if ($\langle \text{oprt} \rangle == "!="$) then

$M_b(\langle \text{left_expr} \rangle, s) \neq M_b(\langle \text{right_expr} \rangle, s)$

Not: $\langle \text{left_expr} \rangle \Rightarrow$ if $M_b(\langle \text{left_expr} \rangle, s) == \text{undef}$
then error
else $! M_b(\langle \text{left_expr} \rangle, s)$

b) $\langle \text{stmt_list} \rangle = \langle \text{stmt} \rangle \mid \langle \text{stmt} \rangle \langle \text{stmt_list} \rangle$

$M_{st}(\langle \text{stmt_list} \rangle, s) \Delta =$

$\langle \text{stmt} \rangle \Rightarrow$ if $(M_{se}(\langle \text{stmt} \rangle, s) == \text{undef})$
then error
else $M_{se}(\langle \text{stmt} \rangle, s)$

$\langle \text{stmt} \rangle \langle \text{stmt_list} \rangle \Rightarrow$ if $(M_{se}(\langle \text{stmt} \rangle, s) == \text{undef})$
then error
else if
 $(M_{se}(\langle \text{stmt_list} \rangle, M_{se}(\langle \text{stmt} \rangle, s)) == \text{undef})$
then error
else
 $M_{se}(\langle \text{stmt_list} \rangle, M_{se}(\langle \text{stmt} \rangle, s))$

Q2 i) $b = (c + 10) / 3$ $\{b > 6\}$

$$\Rightarrow \frac{(c + 10)}{3} > 6$$

$$\Rightarrow c + 10 > 18$$

$$\Rightarrow c > 8$$

So the weakest precondition is $c > 8$

ii) $x = 2 * y + x - 1$ $\{x > 11\}$

$$\Rightarrow 2 * y + x - 1 > 11$$

$$\Rightarrow 2 * y + x > 12$$