1 Q1

Possible to use the **var-decl** rule as well instead of manually checking that i is not in context.

$$\frac{\begin{array}{c}\Gamma \vdash_e e0 : int \quad \forall_{\tau'} : (l, i : \tau') \notin \Gamma \\ \Gamma, (l, i : int) \vdash_e e1 : bool \quad \Gamma, (l, i : int) \vdash_s s1 \\ \Gamma, (l, i : int) \vdash_{sl} s2\end{array}}{\Gamma \vdash_s for\ (int\ i = e0;\ e1;\ s1)\ s2}$$

2 Q2

Assume $\Gamma^{'} = \{(return : int[])\ ,\ (y : int[])\}$ and $\Gamma = \{(return : int[])\}$

$$\dfrac{\begin{array}{c}\dfrac{\dfrac{\dfrac{\dfrac{}{\Gamma^{'} \vdash_e 2 : int}}{\Gamma^{'} \vdash_e new\ int[2] : \tau}}{\Gamma^{'} \vdash_s new\ int[2]} \quad \dfrac{\dfrac{\dfrac{\dfrac{(l,\ y : int[]) \in \Gamma^{'}}{\Gamma^{'} \vdash_e y : \tau_1[]} \quad \dfrac{}{\Gamma^{'} \vdash_e 1 : int}}{\Gamma^{'} \vdash_e y[1] : \tau_1} \quad \dfrac{\Gamma^{'} \vdash_e 1 : int}{\Gamma^{'} \vdash_e 1 : \tau_2} \quad \dfrac{\dfrac{}{int \prec int}}{\tau_2 \prec \tau_1}}{\Gamma^{'} \vdash_s y[1] = 1} \quad \dfrac{\dfrac{A}{\Gamma^{'} \vdash_s return\ y} \quad \dfrac{}{\Gamma^{'} \vdash_{sl} \epsilon}}{\Gamma^{'} \vdash_{sl} return\ y;}}{\Gamma^{'} \vdash_{sl} y[1] = 1;\ return\ y;}}{\Gamma^{'} \vdash_{sl} y = new\ int[2];\ y[1] = 1;\ return\ y;} \\ \forall_{\tau'} : (l, y : \tau') \notin \Gamma\end{array}}{\Gamma \vdash_{sl} int[]\ y;\ y = new\ int[2];\ y[1] = 1;\ return\ y;}$$

$$Rest for A$$

$$\dfrac{(l, y : int[]) \in \Gamma^{'}}{\Gamma^{'} \vdash_e y : \tau_1} \quad \dfrac{(return : int[]) \in \Gamma^{'}}{(return : \tau_2) \in \Gamma^{'}} \quad \dfrac{int[] \prec int[]}{\tau_1 \prec \tau_2}$$