Written Assignment 3
CSE 6341
Due: September 17, 2020, by 12:45 pm

This assignment contains 2 questions, for a total of 6 points. It is OK to write/draw by hand and then scan (or take a photo of) your answer, and then upload that scan/photo. You can submit up to 24 hours after the deadline; if you do so, your score will be reduced by 10%. If you submit more than 24 hours after the deadline, the submission will not be accepted.

Q1 (2 pts): In use scenario 1 for attribute grammars (simple type checking), the solution presented in class allows multiple declarations of the same variable: e.g. code such as int x = 1; int x = 2; will be acceptable. In most real languages this is not acceptable. Show what changes need to be made to the attribute grammar to reject programs with multiple declarations of the same variable. Only show the necessary changes, do not show the entire attribute grammar from the lecture notes. Specifically, show the production(s) of the context-free grammar that are affected, and the corresponding changes to attribute grammar evaluation rules and/or conditions.

Q2 (4 pts): Consider use scenario 2 for attribute grammars (more complex type checking). The following program is valid with respect to the attribute grammar for that scenario.

```c
int f (int x)
{
    int y = 1;
    { int z = g(x+y,x-y); return z; }
}
int g(int x, int y)
{
    int z = x+y;
    {
        int p = x-y;
        { int q = p+1; z = z+q; }
        { int v = p-1; int w = x-1; z = z-v-w; }
    }
    return z;
}
```

Show the tree of symbol tables that will be produced by the typechecker, after accounting for all declarations in the entire program. For each table in the tree, show all identifiers in that table and their corresponding types.