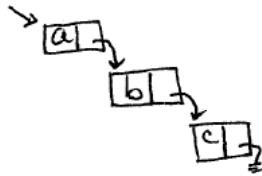


**Concepts of Programming Languages, CSCI 305, Fall 2021
Homework, complete by Sept. 10**

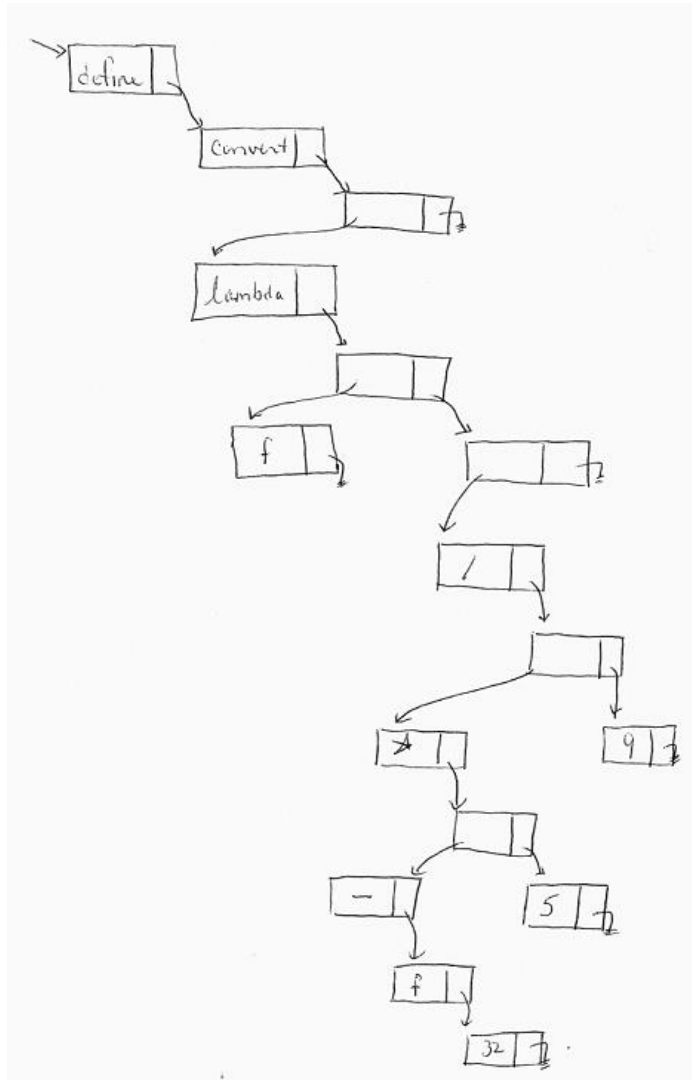
1. Show how the following would be stored in Scheme.

```
(define convert  
  (lambda (f)  
    (/ (* (- f 32) 5) 9)  
  )  
)
```

For example, the list (a b c) is stored as



Answer:



The following code snippets contain errors. For each of the code snippets tell if the error is a:

- a) syntax error detected by the lexical analyzer
- b) syntax error detected by the parser
- c) static semantic analysis error
- d) dynamic semantic analysis error
- e) compiler can't catch, may be caught by the hardware

1.

```
void main ( ) {  
    int x;  
    x = 5 * (x++  
}
```

Syntax error detected by the parser, b.

2.

```
void main ( ) {  
    int p = 3.14;  
}
```

Value going into p is the wrong type - static semantic analysis error, c.

3.

```
void main ( ) {  
    string place#1st = "John";  
}
```

Assuming that # cannot appear within an identifier name, syntax error detected by the lexical analyzer, a.

4.

```
void main ( ) {  
    int marj = 5;  
    mare++;  
}
```

Variable mare was not declared - static semantic analysis error, c.

5.

```
void main ( ) {  
    int a= 0;  
    if (a == 0 )  
        a++;  
    esle  
        a--;  
}
```

Syntax error detected by the parser, b.

6.

```
void main ( ) {  
    int x = 100, y=5;  
    float a;  
    a=x/(y-5);  
}
```

Divide by zero, run-time error, e. All hardware would flag this but the flag could be ignored.

7.

```
void main ( ) {  
    int x;  
    x=x+10;  
}
```

Answer depends on what language.

- FORTRAN used to initialize all variables to 0, so this would not be an error in earlier versions of FORTRAN.
- Java and C# are restricted to “definite assignment” (see bottom of page 33) so the compiler can detect uninitialized variables– static semantic analysis error, c.
- If compiler checks are turned on – dynamic semantic analysis error, d.
- If compiler checks are turned off, no error would be flagged, but there may or may not be a run-time error, depending on the hardware. Some hardware would allow you to run with whatever value was sitting in x at run-time.