ECE 467

```
int foo(int n) {
	int sum = 0;
	for (int i = 0; i < n; i++) {
		sum += i;
	}
	return sum;
}
```

$n*(n-1)/2$

```
int bar(int a) {
	return (a << 16) + (a << 6) - a;
}
```

return 65599*a;

$65599a = 65536a + 64a - 1a$

2^{16} 2^6 2^0

$*2^i \leftrightarrow <<i$

$\Sigma :=$ alphabet $= \{$ symbols $\}$

$= \{a, b, c, \ldots\}$

string := sequence of symbols

$\varepsilon :=$ ""

language := $\{$ strings $\}$

$\{$ cat, dog, bird $\}$

$a \in \Sigma$ a is a re $L(a) = \{a\}$

ε is a re $L(\varepsilon) = \{\varepsilon\}$

if r, s are re

rs $L(rs) = L(r) * L(s)$

$r|s$ $L(r|s) = L(r) + L(s)$

```
product = []
for x in L:
    for y in M:
        product.append(x + y)
```

$L \cdot M = \{xy \mid x \in L, y \in M\}$

$L = \{a\}$ $M = \{b\}$

$\{ab\}$

$L + M = L \cup M$

$\{a, b\}$

abc $L(abc) = \{abc\}$

$(abc)|d$ $L(abc|d) = \{abc, d\}$

$ab(c|d)$ $L(ab(c|d)) = \{abc, abd\}$

$L(a) \cdot L(b) \cdot L(c|d)$

$\{a\} \cdot \{b\} \cdot \{c, d\}$

$\{ab\} \cdot \{c, d\}$

$= \{abc, abd\}$

```
for x ∈ L
    for y ∈ M
        append(x+y)
```

r^* Kleene

$L(r^*) := L(r)^0 + L(r)^1 + L(r)^2 + \dots$

$L(r)^0 = \{\varepsilon\}$

$L(r)^1 = L(r)$

$L(r)^2 = L(r) \cdot L(r)$

$L(a|b)^2 = \{a,b\} \cdot \{a,b\}$

$= \{aa, ab, ba, bb\}$

$(a|b)^* = \{\varepsilon\} + \{a,b\} + \{aa, ab, ba, bb\}$

$+ \dots$

$aaaaaa \in L((a|b)^*)$

$aabba \in$

rs

$r|s$

r^*

$L = \{ cat, dog, bog \}$

$cat | dog | bog$

$cat|((d|b)og)$

$L = \{ aa, aaa, aaaaa, \ldots \}$