3.4.4 核心代码形式化描述及其实现

求解闭包伪代码[1]：

```
SetOfItems CLOSURE (I) {
    repeat
        for ( each item [A → α·Bβ, a] in I )
            for ( each production B → γ in G' )
                for ( each terminal b in FIRST(βa) )
                    add [ B → ·γ, b ] to set I ;
    until no more items are added to I ;
    return I ;
}
```

GOTO 函数伪代码[1]：

```
SetOfItems GOTO ( I, X ) {
    initialize J to be the empty set;
    for ( each item [A → α·Xβ, a] in I )
        add item [A → α·Xβ, a] to set J;
    return CLOSURE(J);
}
```

求解项目集族伪代码[1]：

```
void items ( G' ) {
    initialize C to { CLOSURE( { [S' → ·S, $] } ) };
    repeat
        for ( each set of items I in C )
            for ( each grammar symbol X )
                if ( GOTO ( I, X ) is not empty and not in C )
                    add GOTO ( I, X ) to C;
    until no new sets of items are added to C;
}
```