Compiler
Assignment 5
Top-Down Parsing

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1 Question 1

a) First sets and follow sets

- First set:
  - first(A) = {a, b, c, d, e, ϵ}
  - first(B) = {a, b, ϵ}
  - first(C) = {c, ϵ}
  - first(D) = {d, ϵ}
- Follow set:
  - follow(A) = {$}
  - follow(B) = {c, $}
  - follow(C) = {d, $}
  - follow(D) = {e}

b) Procedures of recursive-decent parser

```
const int a = 1, b = 2, c = 3, d = 4, e = 5;
int token = lexer();
void match(int t)
{
    if (token == t)
        token = lexer();
    else
        error();
}
```

- A:

```
void A() {
    switch (token) {
        case a:
        case b:
        case c:
            B();
            C();
            break;
        case d:
        case e:
            D();
            match(e);
            break;
       default:
            error();
    }
}
```

- B:

```
void B() {
    switch (token) {
        case a:
            match(a);
            B();
            break;
        case b:
            match(b);
            break;
        case c:
            break;
        default:
            error();
    }
}
```

- C:

```
void C() {
    switch (token) {
        case c:
            match(c);
            C();
            match(d);
            break;
        case d:
            break;
        default:
            error();
    }
}
```

- D:

```
void D() {
    switch (token) {
        case d:
            match(d);
            D();
            break;
        case e:
            break;
        default:
            error();
    }
}
```

c) Parsing table of table-driven predictive parser

	A	B	C	D
a	A $\rightarrow$ BC	B $\rightarrow$ aB		
b	A $\rightarrow$ BC	B $\rightarrow$ b		
c	A $\rightarrow$ BC	B $\rightarrow \epsilon$	C $\rightarrow$ cCd	
d	A $\rightarrow$ De		C $\rightarrow \epsilon$	D $\rightarrow$ dD
e	A $\rightarrow$ De			D $\rightarrow \epsilon$
\$				