

Section 2.1 C++11

constexpr Functions

```
constexpr int f1() { return 0; } // automatically inline
inline constexpr int f1();      // redeclares the same f1() above
```

As with all **inline** functions, it is a **one-definition rule (ODR)** violation if definitions in different **translation units** within a program are not token for token the same. If definitions do differ across **translation units**, the program is IFNDR:

```
// file1.h:
inline int f2() { return 0; }
constexpr int f3() { return 0; }

// file2.h:
inline int f2() { return 1; } // Error, no diagnostic required
constexpr int f3() { return 1; } // Error, no diagnostic required
```

When a function is declared **constexpr**, *every* declaration of that function, including its definition, must also be explicitly declared **constexpr**, or else the program is ill formed:

```
constexpr int f4();
constexpr int f4() { return 0; } // OK, constexpr matching exactly

constexpr int f5();
int f5() { return 0; } // Error, constexpr missing

int f6();
constexpr int f6() { return 0; } // Error, constexpr added
```

An **explicit specialization** of a **function template** declaration may, however, differ with respect to its **constexpr** specifier. For example, a general **function template**, e.g., **ft1** in the code snippet below, might be declared **constexpr**, whereas one of its **explicit specializations**, e.g., **ft1<int>**, might not be:

```
template <typename T> // general function template declaration/definition
constexpr bool ft1(T) // general template is declared constexpr
{
    return true;
}

template <> // explicit specialization declaration/definition
bool ft1<int>(int) // The explicit specialization is not constexpr.
{
    return true;
}

static_assert(ft1('a'), ""); // OK, general function template is constexpr.
static_assert(ft1(123), ""); // Error, int specialization is not constexpr.
```

Similarly, the roles can be reversed where only an **explicit specialization**, e.g., **ft2<int>** in the next example, is **constexpr**: