

Problems

- 1.1 Write a program that prints the first sentence of the Gettysburg Address (or your favorite quotation).
- 1.2 Write a program that prints the block letter “B” in a 7 × 6 grid of stars like this:
- ```

* *
* *

* *
* *

```
- 1.3 Write and run a program that prints the first letter of your last name as a block letter of stars in 7 lines.
- 1.4 Write and run a program that shows what happens when each of the following ten “escape sequences” is printed: `\a`, `\b`, `\n`, `\r`, `\t`, `\v`, `\'`, `\"`, `\\`, `\?`.
- 1.5 Write and run a test program that shows how your system handles uninitialized variables.

### Answers to Review Questions

- 1.1 One way is to use the standard C style comment  

```
/* like this */
```

The other way is to use the standard C++ style comment  

```
// like this
```

The first begins with a slash-star and ends with a star-slash. The second begins with a double-slash and ends at the end of the line.
- 1.2 The semicolon is missing from the last statement.
- 1.3 Everything between the double quotes will be printed, including the intended comment.
- 1.4 There are four errors: the precompiler directive on the first line should not end with a semicolon, the parentheses are missing from `main()`, `n` is not declared, and the quotation mark on the last line has no closing quotation mark.
- 1.5 A declaration tells the compiler the name and type of the variable being declared. It also may be initialized in the declaration.
- 1.6 It includes contents of the header file `iostream` into the source code. This includes declarations needed for input and output; e.g., the output operator `<<`.
- 1.7 

```
int main() { }
```
- 1.8 The only thing wrong with these declarations is that `new` is a keyword. Keywords are reserved and cannot be used for names of variables. See Appendix B for a list of the 62 keywords in C++.
- 1.9 The keyword is `int`. The identifiers are `main`, `n`, `cin`, `cout`, and `endl`. The operators are `()`, `>>`, `=`, `*`, and `<<`. The literals are `3` and `"n="`. The punctuation symbols are `{`, `;`, and `}`. The comment is `"// multiply n by 3"`.
- 1.10 *a.* The output object `cout` requires the output operator `<<`. It should be `cout << count;`  
*b.* The word `double` is a keyword in C++; it cannot be used as a variable name. Use: `int d=44;`
- 1.11 Both statements have the same effect: they declare `ch` to be a `char` and initialize it with the value 65. Since this is the ASCII code for `'A'`, that character constant can also be used to initialize `ch` to 65.
- 1.12 `cout << "char(100) = " << char(100) << endl;`
- 1.13 The term “floating-point” is used to describe the way decimal numbers (rational numbers) are stored in a computer. The name refers to the way that a rational number like 386501.294 can be represented in the form  $3.86501294 \times 10^5$  by letting the decimal point “float” to the left 5 places.
- 1.14 Numeric overflow occurs in a computer program when the size of a numeric variable gets too big for its type. For example, on most computers values variables of type `short` cannot exceed 32,767, so if

a variable of that type has the value 32,767 and is then incremented (or increased by any arithmetic operation), overflow will occur.

- 1.15** When integer overflow occurs the value of the offending variable will “wrap around” to negative values, producing erroneous results. When floating-point overflow occurs, the value of the offending variable will be set to the constant `inf` representing infinity.
- 1.16** A run-time error is an error that occurs when a program is running. Numeric overflow and division by zero are examples of run-time errors.
- 1.17** A compile-time error is an error that occurs when a program is being compiled. Examples: syntax errors such as omitting a required semicolon, using an undeclared variable, using a keyword for the name of a variable.

### Solutions to Problems

- 1.1**
- ```
int main()
{ // prints the first sentence of the Gettysburg Address
  cout << "\tFourscore and seven years ago our fathers\n";
  cout << "brought forth upon this continent a new nation,\n";
  cout << "conceived in liberty, and dedicated to the\n";
  cout << "proposition that all men are created equal.\n";
}
Fourscore and seven years ago our fathers
brought forth upon this continent a new nation,
conceived in liberty, and dedicated to the
proposition that all men are created equal.
```
- 1.2**
- ```
int main()
{ // prints "B" as a block letter
 cout << "*****" << endl;
 cout << " * *" << endl;
 cout << " * *" << endl;
 cout << "*****" << endl;
 cout << " * *" << endl;
 cout << " * *" << endl;
 cout << "*****" << endl;
}

 * *
 * *

 * *
 * *

```
- 1.3**
- ```
int main()
{ // prints "W" as a block letter
  cout << " *              *" << endl;
  cout << " * *            *" << endl;
  cout << " * * *          *" << endl;
  cout << " * * * *        *" << endl;
  cout << " * * * * *      *" << endl;
  cout << " * * * * * *    *" << endl;
  cout << " * * * * * * *  *" << endl;
}
 *              *
 * *            *
 * * *          *
 * * * *        *
 * * * * *      *
 * * * * * *    *
 * * * * * * *  *
```
- 1.4**
- ```
int main()
{ // prints escape sequences
 cout << "Prints \\nXXYY\":" << "\nXXYY" << endl;
 cout << "-----" << endl;
 cout << "Prints \\nXX\bYY\":" << "\nXX\bYY" << endl;
 cout << "-----" << endl;
 cout << "Prints \\n\\tXX\\tYY\":" << "\n\tXX\tYY" << endl;
}
Prints \\nXXYY\":" << "\nXXYY"

Prints \\nXX\bYY\":" << "\nXX\bYY"

Prints \\n\\tXX\\tYY\":" << "\n\tXX\tYY"
```

```

cout << "-----" << endl;
cout << "Prints the '\\a' character: " << '\a' << endl;
cout << "-----" << endl;
cout << "Prints the '\\r' character: " << '\r' << endl;
cout << "-----" << endl;
cout << "Prints the '\\v' character: " << '\v' << endl;
cout << "-----" << endl;
cout << "Prints the '\\?' character: " << '\?' << endl;
cout << "-----" << endl;
}

```

```
Prints "\nXXYY":
XXYY
```

```
Prints "\nXX\bYY":
XXY
```

```
Prints "\n\tXX\tYY":
 XX YY
```

```
Prints the '\a' character:
```

```
Prints the '\r' character:
```

```
Prints the '\v' character:
```

```
Prints the '\?' character: ?
```

**1.5**

```

int main()
{ // prints the values of uninitialized variables
 bool b; // not initialized
 cout << "b = " << b << endl;
 char c; // not initialized
 cout << "c = [" << c << "]" << endl;
 int m; // not initialized
 cout << "m = " << m << endl;
 int n; // not initialized
 cout << "n = " << n << endl;
 long nn; // not initialized
 cout << "nn = " << nn << endl;
 float x; // not initialized
 cout << "x = " << x << endl;
 double y; // not initialized
 cout << "y = " << y << endl;
}

```

```

b = 0
c =
m = 4296913
n = 4296716
nn = 4296794
x = 6.02438e-39
y = 9.7869e-307

```