

- W 3. Which of the following are not legal types in C?
- (a) short unsigned int
 - (b) short float
 - (c) long double
 - (d) unsigned long

Section 7.3

- W 4. If `c` is a variable of type `char`, which one of the following statements is illegal?
- (a) `i += c; /* i has type int */`
 - (b) `c = 2 * c - 1;`
 - (c) `putchar(c);`
 - (d) `printf(c);`
5. Which one of the following is not a legal way to write the number 65? (Assume that the character set is ASCII.)
- (a) `'A'`
 - (b) `0b1000001`
 - (c) `0101`
 - (d) `0x41`
6. For each of the following items of data, specify which one of the types `char`, `short`, `int`, or `long` is the smallest one guaranteed to be large enough to store the item.
- (a) Days in a month
 - (b) Days in a year
 - (c) Minutes in a day
 - (d) Seconds in a day
7. For each of the following character escapes, give the equivalent octal escape. (Assume that the character set is ASCII.) You may wish to consult Appendix E, which lists the numerical codes for ASCII characters.
- (a) `\b`
 - (b) `\n`
 - (c) `\r`
 - (d) `\t`
8. Repeat Exercise 7, but give the equivalent hexadecimal escape.

Section 7.4

9. Suppose that `i` and `j` are variables of type `int`. What is the type of the expression `i / j + 'a'`?
- W 10. Suppose that `i` is a variable of type `int`, `j` is a variable of type `long`, and `k` is a variable of type `unsigned int`. What is the type of the expression `i + (int) j * k`?
11. Suppose that `i` is a variable of type `int`, `f` is a variable of type `float`, and `d` is a variable of type `double`. What is the type of the expression `i * f / d`?
- W 12. Suppose that `i` is a variable of type `int`, `f` is a variable of type `float`, and `d` is a variable of type `double`. Explain what conversions take place during the execution of the following statement:
- ```
d = i + f;
```

13. Assume that a program contains the following declarations:

```
char c = '\1';
short s = 2;
int i = -3;
long m = 5;
float f = 6.5f;
double d = 7.5;
```

Give the value and the type of each expression listed below.

- |                        |                        |                          |
|------------------------|------------------------|--------------------------|
| (a) <code>c * i</code> | (c) <code>f / c</code> | (e) <code>f - d</code>   |
| (b) <code>s + m</code> | (d) <code>d / s</code> | (f) <code>(int) f</code> |

- W 14. Does the following statement always compute the fractional part of `f` correctly (assuming that `f` and `frac_part` are `float` variables)?

```
frac_part = f - (int) f;
```

If not, what's the problem?

## Section 7.5

15. Use `typedef` to create types named `Int8`, `Int16`, and `Int32`. Define the types so that they represent 8-bit, 16-bit, and 32-bit integers on your machine.

## Programming Projects

- W 1. The `square2.c` program of Section 6.3 will fail (usually by printing strange answers) if `i * i` exceeds the maximum `int` value. Run the program and determine the smallest value of `n` that causes failure. Try changing the type of `i` to `short` and running the program again. (Don't forget to update the conversion specifications in the call of `printf`!) Then try `long`. From these experiments, what can you conclude about the number of bits used to store integer types on your machine?
- W 2. Modify the `square2.c` program of Section 6.3 so that it pauses after every 24 squares and displays the following message:
- ```
Press Enter to continue...
```
- After displaying the message, the program should use `getchar` to read a character. `getchar` won't allow the program to continue until the user presses the Enter key.
3. Modify the `sum2.c` program of Section 7.1 to sum a series of `double` values.
4. Write a program that translates an alphabetic phone number into numeric form:
- ```
Enter phone number: CALLATT
2255288
```
- (In case you don't have a telephone nearby, here are the letters on the keys: 2=ABC, 3=DEF, 4=GHI, 5=JKL, 6=MNO, 7=PRS, 8=TUV, 9=WXYZ.) If the original phone number contains nonalphabetic characters (digits or punctuation, for example), leave them unchanged:
- ```
Enter phone number: 1-800-COL-LECT
1-800-265-5328
```
- You may assume that any letters entered by the user are upper case.