

9. Are the following if statements equivalent? If not, why not?

```

if (score >= 90)      if (score < 60)
    printf("A");      printf("F");
else if (score >= 80) else if (score < 70)
    printf("B");      printf("D");
else if (score >= 70) else if (score < 80)
    printf("C");      printf("C");
else if (score >= 60) else if (score < 90)
    printf("D");      printf("B");
else                  else
    printf("F");      printf("A");

```

Section 5.3

10. What output does the following program fragment produce? (Assume that *i* is an integer variable.)

```

i = 1;
switch (i % 3) {
    case 0: printf("zero");
    case 1: printf("one");
    case 2: printf("two");
}

```

11. The following table shows telephone area codes in the state of Georgia along with the largest city in each area:

Area code	Major city
229	Albany
404	Atlanta
470	Atlanta
478	Macon
678	Atlanta
706	Columbus
762	Columbus
770	Atlanta
912	Savannah

Write a switch statement whose controlling expression is the variable `area_code`. If the value of `area_code` is in the table, the switch statement will print the corresponding city name. Otherwise, the switch statement will display the message "Area code not recognized". Use the techniques discussed in Section 5.3 to make the switch statement as simple as possible.

Programming Projects

1. Write a program that calculates how many digits a number contains:

```

Enter a number: 374
The number 374 has 3 digits

```

You may assume that the number has no more than four digits. *Hint:* Use `if` statements to test the number. For example, if the number is between 0 and 9, it has one digit. If the number is between 10 and 99, it has two digits.

- W 2. Write a program that asks the user for a 24-hour time, then displays the time in 12-hour form:

Enter a 24-hour time: 21:11
 Equivalent 12-hour time: 9:11 PM
 Be careful not to display 12:00 as 0:00.

3. Modify the `broker.c` program of Section 5.2 by making both of the following changes:
- Ask the user to enter the number of shares and the price per share, instead of the value of the trade.
 - Add statements that compute the commission charged by a rival broker (\$33 plus 3¢ per share for fewer than 2000 shares; \$33 plus 2¢ per share for 2000 shares or more). Display the rival's commission as well as the commission charged by the original broker.

- W 4. Here's a simplified version of the Beaufort scale, which is used to estimate wind force:

<i>Speed (knots)</i>	<i>Description</i>
Less than 1	Calm
1-3	Light air
4-27	Breeze
28-47	Gale
48-63	Storm
Above 63	Hurricane

Write a program that asks the user to enter a wind speed (in knots), then displays the corresponding description.

5. In one state, single residents are subject to the following income tax:

<i>Income</i>	<i>Amount of tax</i>
Not over \$750	1% of income
\$750-\$2,250	\$7.50 plus 2% of amount over \$750
\$2,250-\$3,750	\$37.50 plus 3% of amount over \$2,250
\$3,750-\$5,250	\$82.50 plus 4% of amount over \$3,750
\$5,250-\$7,000	\$142.50 plus 5% of amount over \$5,250
Over \$7,000	\$230.00 plus 6% of amount over \$7,000

Write a program that asks the user to enter the amount of taxable income, then displays the tax due.

- W 6. Modify the `upc.c` program of Section 4.1 so that it checks whether a UPC is valid. After the user enters a UPC, the program will display either VALID or NOT VALID.

7. Write a program that finds the largest and smallest of four integers entered by the user:

Enter four integers: 21 43 10 35
 Largest: 43
 Smallest: 10

Use as few `if` statements as possible. *Hint:* Four `if` statements are sufficient.

8. The following table shows the daily flights from one city to another:

<i>Departure time</i>	<i>Arrival time</i>
8:00 a.m.	10:16 a.m.
9:43 a.m.	11:52 a.m.
11:19 a.m.	1:31 p.m.
12:47 p.m.	3:00 p.m.

2:00 p.m.	4:08 p.m.
3:45 p.m.	5:55 p.m.
7:00 p.m.	9:20 p.m.
9:45 p.m.	11:58 p.m.

Write a program that asks user to enter a time (expressed in hours and minutes, using the 24-hour clock). The program then displays the departure and arrival times for the flight whose departure time is closest to that entered by the user:

Enter a 24-hour time: 13:15

Closest departure time is 12:47 p.m., arriving at 3:00 p.m.

Hint: Convert the input into a time expressed in minutes since midnight, and compare it to the departure times, also expressed in minutes since midnight. For example, 13:15 is $13 \times 60 + 15 = 795$ minutes since midnight, which is closer to 12:47 p.m. (767 minutes since midnight) than to any of the other departure times.

9. Write a program that prompts the user to enter two dates and then indicates which date comes earlier on the calendar:

Enter first date (mm/dd/yy): 3/6/08

Enter second date (mm/dd/yy): 5/17/07

5/17/07 is earlier than 3/6/08

- W 10. Using the switch statement, write a program that converts a numerical grade into a letter grade:

Enter numerical grade: 84

Letter grade: B

Use the following grading scale: A = 90–100, B = 80–89, C = 70–79, D = 60–69, F = 0–59. Print an error message if the grade is larger than 100 or less than 0. *Hint:* Break the grade into two digits, then use a switch statement to test the ten's digit.

11. Write a program that asks the user for a two-digit number, then prints the English word for the number:

Enter a two-digit number: 45

You entered the number forty-five.

Hint: Break the number into two digits. Use one switch statement to print the word for the first digit ("twenty," "thirty," and so forth). Use a second switch statement to print the word for the second digit. Don't forget that the numbers between 11 and 19 require special treatment.

6.1 The while Statement