

Solutions

09.00am – 09.50am, Thursday, March 12, 2015

Problem 1 Write a complete C++ program that does the following.

1. It asks the user to enter an integer between 100 and 9999.
2. If the entered number is out of range, the program forces the user to enter more numbers until one in the correct range is given.
3. Then the program prints the digits in the number (in reverse) on separate lines.

Here is an example of how the program should work:

```
Enter an integer between 100 and 9999: 8976
6
7
9
8
```

Answer:

```
#include <iostream>
using namespace std;

int main() {
    int n;
    cout << "Enter an integer between 100 and 9999: ";
    cin >> n;
    while (n < 100 || n > 9999) {
        cout << "Out of range. Try again: ";
        cin >> n;
    }
    while (n > 0) {
        cout << n % 10 << endl;
        n = n / 10;
    }
    return 0;
}
```

Problem 2

Write C++ statements to carry out the following tasks. Do not write complete programs, just give a few lines of C++ code. Your answers must be short and must fit in the spaces provided. Assume the following variables have been declared

```
int x, y;
```

- (a) Prompt for, and read values for x and y from the user.

Answer:

```
cout << "Enter 2 integers: ";
cin >> x >> y;
```

- (b) Print x copies of the number y, without spaces on one line of output.

Answer:

```
for (int c = 1; c <= x; c++) cout << y;    cout << endl;
```

(c) Print the remainder when x is divided by y

Answer:

```
cout << x % y << endl;
```

(d) If x and y are both between 10 and 99 print 6 copies of the word "Hello" on a single line.

Answer:

```
if (x > 9 && x < 100 && y > 9 && y < 100)
    for (int c = 1; c <= 6; c++) cout << "Hello ";
cout << endl;
```

(e) Print the average of x and y

Answer:

```
cout << (x + y) / 2.0 << endl;
```

Problem 3 Consider the following C++ program.

```
#include <iostream>
using namespace std;

int main() {
    int x = 7, y = 10, z = 65;
    string freddy = "fred";
    string fred = "freddy";
    cout << "fred" << " " << fred << endl;           // line (a)
    cout << (z % y) / x << endl;                     // line (b)
    if ((x > y) && (y > x)) cout << fred << endl;    // line (c)
    cout << fred << freddy << endl;                 // line (d)
    cout << x << "*" << y << "=" << z << "\n";     // line (e)
}
```

(a) What is the output at line (a)?

Answer:

```
fred freddy
```

(b) What is the output at line (b)?

Answer:

```
0
```

(c) What is the output at line (c)?

Answer:

(d) What is the output at line (d)?

Answer:

freddyfred

(e) What is the output at line (e)?

Answer:

7*10=65

Problem 4 Write a complete C++ program that asks the user for a height h and prints a white X pattern (made of spaces) against a dark background made of Xs.

For example, if the user specified 7 for h , the program would print as follows:

```
XXXXX
X XXX X
XX X XX
XXX XXX
XX X XX
X XXX X
XXXXX
```

Answer:

```
#include <iostream>
using namespace std;

int main() {
    int h;
    cout << "Enter a height h: ";
    cin >> h;
    for (int r = 1; r <= h; r++) {
        for (int c = 1; c <= h; c++) {
            if ((r == c) || ((r + c) == (h + 1))) cout << " ";
            else cout << "X";
        }
        cout << endl;
    }
    return 0;
}
```

Solutions

11.10am – 12.00noon, Thursday, March 12, 2015

Problem 1 Write a complete C++ program that does the following.

1. It asks the user to enter a 2-digit integer.
2. If the entered number does not have 2 digits, the program forces the user to enter further integers until one with 2 digits is given.
3. The program then prints the bigger of the 2 digits in the user's number (either digit in case they are the same).

Here is an example of how the program should work:

```
Enter a 2-digit integer: 123
That does not have 2 digits. Try again: 35
The bigger digit is 5
```

Answer:

```
#include <iostream>
using namespace std;

int main() {
    int n;
    cout << "Enter a 2-digit integer: ";
    cin >> n;
    while (n < 10 || n > 99) {
        cout << "That does not have 2 digits. Try again: ";
        cin >> n;
    }
    int a = n % 10, b = n / 10;
    cout << "The bigger digit is ";
    if (a > b) cout << a;
    else cout << b;
    cout << endl;
    return 0;
}
```

Problem 2

Write C++ statements to carry out the following tasks. Do not write complete programs, just give a few lines of C++ code. Your answers must be short and must fit in the spaces provided. Assume the following variables have been declared

```
int x, y; string name;
```

- (a) Prompt for, and read values for x, y and name from the user.

Answer:

```
cout << "Enter 2 integers and your name. ";
cin >> x >> y >> name;
```

- (b) If y is 0 print "Illegal Division" otherwise the exact value of x divided by y is printed

Answer:

```
if (y == 0) cout << "Illegal division" << endl;
else cout << ((double) x) / y << endl;
```

(c) Drop any minus sign in x or y to make sure they are both positive.

Answer:

```
if (x < 0) x = -x;
if (y < 0) y = -y;
```

(d) Say Hello to the user (eg "Hello Freddy") x times on x different lines.

Answer:

```
for (int c = 1; c <= x; c++) cout << "Hello " << name << endl;
```

(e) Print the bigger of x and y followed by the smaller.

Answer:

```
if (x >= y) cout << x << " " << y << endl;
else cout << y << " " << x << endl;
```

Problem 3 Consider the following C++ program.

```
#include <iostream>
using namespace std;

int main() {
    int x = 7, y = 10, z = 65;
    string freddy = "fred";
    string fred = "freddy";
    for (int c = x; c < y; c++) cout << freddy; cout << endl; // line (a)
    cout << (z % y) / (y % x) << endl; // line (b)
    if ((x > y) || (y > x)) cout << fred << endl; // line (c)
    cout << fred << " * " << (y - x) << endl; // line (d)
    cout << x << "%" << y << "=" << "x % y" << "\n"; // line (e)
}
```

(a) What is the output at line (a)?

Answer:

fredfredfred

(b) What is the output at line (b)?

Answer:

1

(c) What is the output at line (c)?

Answer:

freddy

(d) What is the output at line (d)?

Answer:

```
freddy * 3
```

(e) What is the output at line (e)?

Answer:

```
7%10=x % y
```

Problem 4 Write a complete C++ program that asks the user for a width w and prints a white arrow pattern (made of spaces) against a dark background made of Xs.

For example, if the user specified 5 for w , the program would print as follows:

```
XXXX
X XXX
XX XX
XXX X
XXXX
XXX X
XX XX
X XXX
XXXX
```

Answer:

```
#include <iostream>
using namespace std;

int main() {
    int w;
    cout << "Enter a width w: ";
    cin >> w;
    for (int r = 1; r < 2*w; r++) {
        for (int c = 1; c <= w; c++) {
            if ((r == c) || ((r + c) == (2 * w))) cout << " ";
            else cout << "X";
        }
        cout << endl;
    }
    return 0;
}
```