Problem 1 Write the best title lines for the functions that are called by the following main program. Do not supply blocks for the functions.

int main() {
    string fullName = "Freddy Next Door";
    int a2[2][3] = {{-2, 4, 3}, {-3, 4, 2}};
    int a[5] = {7, 6, 5, 9, 7};
    cout << middleDigit(19683) + 1 << endl; // (a) prints: 7 as 6 + 1
    cout << random(a2, 2, 3) << endl; // (b) prints random entry eg 4
    cout << initials(fullName) << endl; // (c) prints: F.N.D.
    makePositive(a2[0][0]); // (d) make a2[0][0] positive
    cout << number7s(a, 5); // (e) prints 2: the number of 7s
    return 0;
}

(a) Title line for middleDigit.
Answer: int middleDigit(int x)

(b) Title line for random.
Answer: int random(int[][3], int r, int c)

(c) Title line for initials.
Answer: string initials(string x)

(d) Title line for makePositive.
Answer: void makePositive(int &x)

(e) Title line for number7s.
Answer: int number7s(int x[], int cap)

Problem 2 Consider the following C++ program.

#include <iostream>
using namespace std;

int fun(int &x, int y) {
    x = x + 1;
    y = y - 1;
    return y;
}

int main() {
int x = 2, y = 7, z = 10; string s = "007";
cout << ((double) y) / x << endl; // line (a)
if (!((x > y) && (y > 5))) s = "008";
cout << s << endl; // line (b)
z %= y; cout << z << endl; // line (c)
cout << fun(z, y) << endl; // line (d)
fun(x, y); cout << y - x * 2 << endl; // line (e)
}

(a) What is the output at line (a)?
Answer:
3.5

(b) What is the output at line (b)?
Answer:
008

(c) What is the output at line (c)?
Answer:
3

(d) What is the output at line (d)?
Answer:
6

(e) What is the output at line (e)?
Answer:
1

Problem 3  Write a function called removeLast0 that prints an integer parameter without its rightmost 0. If there is no 0, print the number itself. If the number is 0, print nothing.

For example, a program that uses the function removeLast0 follows.

int main() {
    removeLast0(7070); // prints 707
    cout << endl;
    removeLast0(7007); // prints 707
    cout << endl;
    removeLast0(777); // prints 777
    cout << endl;
    return 0;
}

Answer:

void removeLast0(int n) {
    if (n == 0) return;
    if (n % 10 == 0) cout << n/10;
    else {
        removeLast0(n/10);
        cout << n % 10;
    }
}
Problem 4  Write a function called largestGap that returns the largest gap between two adjacent elements of an array.

For example, a program that uses the function largestGap follows, it prints 7 since the largest gap is between the 9 and the 2.

```cpp
test
```
Problem 1 Write the best title lines for the functions that are called by the following main program. Do not supply blocks for the functions.

```cpp
int main() {
    string fullName = "Freddy Next Door";
    int a2[2][3] = {{-2, 4, 3}, {-3, 4, 2}};
    int a[5] = {7, 6, 5, 9, 7};
    cout << firstLetter(fullName) << endl; // (a) prints: F
    cout << sumFirstCol(a2, 2, 3) << endl; // (b) prints: -5 (as -2 + -3).
    cout << middleName(fullName) << endl; // (c) prints: Next
    makeRandom(a2, 2, 3); // (d) reset the array with random entries
    cout << round(((double) a[0]) / ((double) a[1])); // (e) prints 1
        // the nearest integer to the ratio.
    return 0;
}
```

(a) Title line for `firstLetter`.
Answer:

```cpp
char firstLetter(string x)
```

(b) Title line for `sumFirstCol`.
Answer:

```cpp
int sumFirstCol(int x[][3], int r, int c)
```

(c) Title line for `middleName`.
Answer:

```cpp
string middleName(string x)
```

(d) Title line for `makeRandom`.
Answer:

```cpp
void makeRandom(int x[][3], int r, int c)
```

(e) Title line for `round`.
Answer:

```cpp
int round(double x)
```

Problem 2 Consider the following C++ program.

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

int fun(int x, int &y) {
    x = x + 1;
    y = y - 1;
    return y;
}
```
int main() {
    int x = 3, y = 9, z = 10; string s = "Yes";
    cout << ((double) x) / z << endl; // line (a)
    if (!((x > y) || (y > 5))) s = "No";
    cout << s << endl; // line (b)
    z %= y; cout << z << endl; // line (c)
    cout << fun(z, y) << endl; // line (d)
    fun(x, y); cout << y - x % 2 << endl; // line (e)
}

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

**Answer:**

0.3

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

**Answer:**

Yes

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

**Answer:**

1

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

**Answer:**

8

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

**Answer:**

6

**Problem 3**  Write a function called `removeLast7` that removes the rightmost 7 from an integer parameter. If there is no 7, it makes no change.

For example, a program that uses the function `removeLast7` follows.

```cpp
int main() {
    cout << removeLast7(777) << endl; // prints 77
    cout << removeLast7(1727) << endl; // prints 172
    cout << removeLast7(1234) << endl; // prints 1234
    return 0;
}
```

**Answer:**

```cpp
int removeLast7(int n) {
    if (n == 0) return 0;
    if (n % 10 == 7) return n/10;
    return 10 * removeLast7(n/10) + n%10;
}
```

**Problem 4**  Write a function called `smallestProduct` that returns the smallest product formed by two adjacent elements of an array.

For example, a program that uses the function `smallestProduct` follows, it prints 3 since the smallest product is between the 3 and the 1.
int main() {
    int x[] = {3, 1, 4, 1, 5, 9, 2, 6};
    cout << smallestProduct(x, 8) << endl; // prints 3
    return 0;
}

Answer:

int smallestProduct(int x[], int n) {
    int min = x[0] * x[1];
    for (int i = 1; i < n; i++)
        if (x[i] * x[i - 1] < min) min = x[i] * x[i - 1];
    return min;
}