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CMPSC 16 F21

Midterm Exam

E01

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Section 1. Multiple Choice (35 points)

Please clearly indicate your choice by circling the appropriate letter. If you make a mistake and have to correct your initial choice, be sure that your intent is clear. (5 pts each)

1. Which block of C++ code generates this output:

```
I wish
you were here
```

(a)
```
cout << "I wish" + "you were here";
```

(b)
```
cout << "I wish" << endl;
cout << "you were here";
```

(c)
```
cout << "I wish";
cout << "you were here" << endl;
```

(d)
```
cout << "I wish" << ln << "you were here";
```

(e)
```
cout << "I wish"
     << "you were here";
```

2. What is the value of `y` after executing the following C++ statements?

```
x = 5;
y = x + 1;
y = y * 2;
```

(a) 5

(b) 6

(c) 8

(d) 12

(e) 0

3. Given this C++ statement:

```
w = y + 2 + 3 * x + z;
```

Which expression is evaluated first?

(a) `w = y`

(b) `y + 2`

(c) `2 + 3`

(d) `3 * x`

(e) `x + z`

4. Which is the correct representation of 3.9e-5?

   (a) 0.000039

   (b) 0.00039

   (c) 3.90000

   (d) 390000

   (e) 3900000

5. What is the output of the following code?

```
1  #include <iostream>
2  using namespace std;
3
4  int main(){
5    int x = 10;
6    while( x > 5){
7      if( x % 3 == 0) {
8        cout << x << " ";
9      }
10     x--;
11   }
12   cout << endl;
13   return 0;
14 }
```

   (a) The program produces no output at all

   (b) `3`

   (c) `6`

   (d) `3 6 9`

   (e) `9 6`

   (f) `9 6 3`

6. For which quantity is a double the best type?

   (a) People in a household

   (b) Boxes on a conveyor belt

   (c) Planes above a city

   (d) Height of a building

   (e) Number of students in a course

7. What is the final value of `x`?

```
int y = 6;
x = (1 / 2) * y + 8;
```

(a) 7
(b) 8
(c) 11
(d) 14
(e) 0

Section 2. Questions about Q5.cpp, (15 pts)

(5 pts each)

The next few problems pertain to the following code from the program `Q5.cpp`:

```
1  // Q5.cpp
2  #include <iostream>
3  using namespace std;
4
5  int calc1 (int a, int b) {
6     return a + b / 2;
7  }
8  int calc2 (int a, int b) {
9     return a * b / 100;
10 }
11 int main() {
12    int x;
13    int y;
14    x = calc1 (5,3);
15    cout << x << " ";
16    y = calc1 (3,5);
17    cout << y << " ";
18    cout << calc2 (5,3) << endl;
19 }
```

8. How many function definitions are in the `Q5.cpp` listing?

   (a) none
   (b) one
   (c) two
   (d) three
   (e) four
   (f) more than four

9. How many function calls are in the `Q5.cpp` listing? (Don't count method calls that are implied by the use of the `<<` operator; only function calls to functions defined in the code listing.)

   (a) none
   (b) one
   (c) two
   (d) three
   (e) four
   (f) more than four

10. What is the output of the `Q5.cpp` program when run?

    (a) The program produces no output
    (b) `6 0 0`
    (c) `6.5 5.5 0.15`
    (d) `6 5 0`
    (e) `6 5 0.15`

Section 3. Questions added after Tuesday Lecture (10 pts)

11. Consider the program `shippingCharge.cpp` shown below.

```
1  #include <iostream>
2  using namespace std;
3
4  void printShippingCharge(double itemWeight) {
5     if ((itemWeight > 0.0) && (itemWeight <= 10.0)) {
6        cout << (itemWeight * 0.75) << endl;
7     }
8    else if ((itemWeight > 10.0) && (itemWeight <= 15.0)) {
9       cout << (itemWeight * 0.85) << endl;
10    }
11   else if ((itemWeight > 15.0) && (itemWeight <= 20.0)) {
12       cout << (itemWeight * 0.95)<< endl;
13    }
14 }
15 int main() {
16    printShippingCharge(18);
17    printShippingCharge(6);
18    printShippingCharge(25);
19    printShippingCharge(30);
20    return 0;
21 }
```

How many `cout` statements are executed when this program is run?

(a) None: the program produces no output

(b) 1

(c) 2

(d) 3

(e) 4

(f) 5

(g) More than 5

12. Consider the program `waterTemp.cpp` shown below.

```
1  #include <iostream>
2  using namespace std;
3
4  void printWaterTemperatureForCoffee(int temp) {
5     if (temp < 195) {
6        cout << "Too cold.";
7     }
8     else if ((temp >= 195) && (temp <= 205)) {
9        cout << "Perfect temperature.";
10    }
11    else if (temp > 205) {
12       cout << "Too hot.";
13    }
14 }
15
16 int main() {
17    printWaterTemperatureForCoffee(205);
18    printWaterTemperatureForCoffee(190);
19    cout << endl;
20    return 0;
21 }
```

What is the output of the `waterTemp.cpp` program when run?

(a) The program produces no output

(b) `Too cold.`

(c) `Perfect temperature.`

(d) `Perfect temperature.`
`Too cold.`

(e) `Perfect temperature.`
`Too hot.`

(f) `Perfect temperature.Too cold.`

(g) `Perfect temperature.Too hot.`

(h) `Too Cold.Perfect temperature.Too hot.`

Section 4. Number Conversions (20 pts)

(5 pts each)

Please perform the following number conversions. You do not need to show your work; just put your final answer in the box indicated.

13. Convert the binary number 00001111 to a decimal number.

14. Convert the binary number 00010010 to a decimal number.

15. Convert the binary number 01000001 to a decimal number.

16. Convert the decimal number 17 to an 8-bit binary number.

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Section 5. Quadratic (20 pts)

(5 pts each)

Consider a C++ program to evaluate the value of a quadratic polynomial of the form $f(x) = ax^2 + bx + c$ for values of a,b,c and x given on the command line, as in these examples runs:

```
$ ./quadratic 1 2 3 4
f(x)=27
$ ./quadratic 4 2 10 3
f(x)=52
$ ./quadratic 3 4 5 1
f(x)=12
```

An incomplete C++ program to calculate this result appears on the next page.

Please complete the program by filling in the blanks at these places:

17. Lines 8-10. (Note that you may be able to answer in a single line; I've provided three lines so you have plenty of space for your answer.)

18. On line 15, fill inside the parentheses, before `!= 5`.

19. On lines 20-23, fill in the four blanks between the square brackets, i.e. each of the places `argv[ ]` appears.

20. Fill in the blank on line 25. If the space is too small, you can write your answer near the blank and use an arrow (e.g. ↗) to show where your answer is.

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```
1  #include <iostream>
2  #include <cmath>
3  #include <cstdlib>
4
5  using namespace std;
6
7  int evalQuadratic(int a, int b, int c, int x) {
8
9
10
11 }
12
13 int main(int argc, char *argv[]) {
14
15   if (              != 5) {
16     cerr << "Usage: ./quadratic a b c x" << endl;
17     exit(1);
18   }
19
20   int a = atoi(argv[     ]);
21   int b = atoi(argv[     ]);
22   int c = atoi(argv[     ]);
23   int x = atoi(argv[     ]);
24
25   cout << "f(x)=" <<                                  << endl;
26
27   return 0;
28 }
```

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Answer Key for Exam A

Section 1. Multiple Choice (35 points)

1. (b)
2. (d)
3. (d)
4. (a)
5. (e)
6. (d)
7. (b)

Section 2. Questions about Q5.cpp, (15 pts)

8. (d)
9. (d)
10. (d)

Section 3. Questions added after Tuesday Lecture (10 pts)

11. (c)

12. (f)

Section 4. Number Conversions (20 pts)

13. 15

14. 18

15. 65

16. 00010001

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Section 5. Quadratic (20 pts)

17. The following code should be put in the blank:

```
return a * x * x + b * x + c ;
```

18. The following code should be put in the blank:

```
16    if (argc != 5) {
```

19. The following code should be put in the blank:

```
21    int a = atoi(argv[1]);
22    int b = atoi(argv[2]);
23    int c = atoi(argv[3]);
24    int x = atoi(argv[4]);
```

20. The following code should be put in the blank:

```
26    cout << "f(x)=" << evalQuadratic(a,b,c,x) << endl;
```

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```
1  #include <iostream>
2  #include <cmath>
3  #include <cstdlib>
4
5  using namespace std;
6
7  int evalQuadratic(int a, int b, int c, int x) {
8
9
10
11 }
12
13 int main(int argc, char *argv[]) {
14
15   if (              != 5) {
16     cerr << "Usage: ./quadratic a b c x" << endl;
17     exit(1);
18   }
19
20   int a = atoi(argv[     ]);
21   int b = atoi(argv[     ]);
22   int c = atoi(argv[     ]);
23   int x = atoi(argv[     ]);
24
25   cout << "f(x)=" <<                                  << endl;
26
27   return 0;
28 }
```