ACMS 20210, Sample Exam #1

Justify your responses and show all work, unless indicated otherwise.
For every program that you write or read on this exam, you do not have to account for checking whether inputs are correct (i.e. always assume the user enters a reasonable value).

1. Correct the following broken C++ code (to preserve the programmer's intent) so that it will compile and produce reasonable looking output.

```
main(){

  cout << 'Enter an integer for your selection: (1) Music (2) Video (3) Quiet: ';
  cin >> n;

  switch(n){
    case 1:
      cout << 'You have selected music.';
    case 2:
      cout << 'You have selected video.';
    case 3:
      cout << 'You have selected quiet.';
    default:
      cout << 'That is not a valid selection.';
  }

  cout << 'Thank you.';

  return 0;
}
```

2. • Let P and Q be mathematical statements. Show that $(P \vee Q) \wedge P \equiv P$.

• Let P and Q be mathematical statements. Show that $(P \wedge \sim Q) \vee (Q \vee \sim P)$ is a tautology (look up the definition of tautology!).

• Let P, Q and R be mathematical statements. Show that
$\sim (P \wedge (Q \vee R)) \equiv [(\sim P) \vee (\sim Q)] \wedge [(\sim P) \vee (\sim R)]$.

3. For each of the following, determine the value of the appropriate variable at the end of execution of the C++ code. Show a reasonable amount of work.

   - At the end of execution of the following code, what are the values of a and b?

```
int a = 3;
int b = 4 * a;
while (a < b) {
  a *= 2;
  b += 7;
}
```

   - At the end of execution of the following code, what is the value of *total*?

```
int total = 0;
for (int i = 1; i < 10; i++) {
  total += (i/3);
}
```

   - At the end of execution of the following code, what is the value of c?

```
int a = 2;
int b = 3;
int c;

if ( (a + b < 7) && (a - b > 5) ) {
  c = a - b;
} else if ( (a - b > 0) || (b + a > 4) ) {
  c = a * b;
} else {
  c = a + 2*b;
}
```

4. Write a short C++ program that prompts the user to enter three integers, and then prints the three integers from least to greatest (by order).

5. Write a C++ program that repeatedly prompts the user to enter positive integers (and stops prompting after receiving an input of a negative value or 0). The program then reports the sum and the average of the integers that the user has entered.