Study Questions

1. Match each term with its description.

d microprocessor
f graphical-user interface (GUI)
b memory
g secondary storage
a ALU
h operating system
e CU
c compiler

a) component of the CPU that does arithmetic and comparisons.
b) numbered sequence of storage cells containing data or instructions.
c) program that translates a high-level programming language into computer machine language.
d) a central processing unit on a single integrated circuit.
e) component of the CPU that decodes computer instructions.
f) pictures and menus displayed to allow the user to select commands and data.
g) units such as disks or tapes which retain data even when the power to the disk drive or tape drive is shut off.
h) software responsible for directing all computer operations and managing all computer resources.

2. Match the first four steps of the software development method with their descriptions:
b Requirements specification
c Design
a Implementation
d Analysis

a) writing the code for the system in a high-level language.
b) defining the problem.
c) reviewing and refining the descriptive model of the system: identifying classes to reuse and developing algorithms for the behaviors of new classes needed.
d) identifying the kinds of objects whose behavior will be modeled by the new system.

3. Short Answer:
What is object-oriented programming?
A methodology that creates programs composed of semiautonomous agents called objects

4. Consider the following program:

```
//  This program computes the time it takes to reach a
//  destination, given the speed of a vehicle in miles per
hour
//  and the distance traveled in miles.

#include <iostream>
using namespace std;

int main ()
{
   double distance;    // distance traveled
   double time;      // hours to reach destination
   double rate;      // speed of the vehicle

   cout << "Enter the distance traveled in miles => ";
   cin >> distance;
    cout << endl;
   cout << "Enter the speed of the vehicle (mph) => ";
   cin >> speed;
    cout << endl;
   time = distance / rate;
   cout << "The time it takes to reach the destination is ";
```

```
   cout << endl << time << " hours.;
      cout << endl;

   return 0;
}
```

What would be the output of the program above given the following input data? 300 60

```
_Enter the distance traveled in miles => 300

 Enter the speed of the vehicle (mph) => 60

 The time it takes to reach the destination is
5 hours.
```

5. Consider the following program:

```
   // This program determines the percentage grade on
   // an exam, given the number of questions missed,
   // how many points each question was worth,
   // and the total points possible.

   #include <iostream>
   using namespace std;

   int main()
   {
      int    pointsPerQuestion;
      int    numberMissed;
      double percentageGrade;
      double pointsPossible;

      cout << "Enter the total points possible on the exam
      => ";
      cin  >> pointsPossible;
      cout << endl;
      cout << "Enter the number of points per question => ";
      cin  >> pointsPerQuestion;
      cout << endl
      cout <<"Enter the number of questions missed => ";
      cin >> numberMissed;

      percentageGrade = (pointsPossible - numberMissed *
      pointsPerQuestion)  / pointsPossible  *  100;

      cout << endl << "The percentage grade is ";
```

```
    cout << percentageGrade << "%" << endl;

    //answer to 8 here
    if (percentageGrade >= 60)
      cout << “This score is passing” << endl;
    else
      cout << This score is failing” << endl;


    return 0;
}
```

6. Is the calculation of percentageGrade correct? If not, correct it.
7. What will happen if the data type of pointsPossible is changed from double to int? __All scores will be zero_
8. Add an if-else statement displaying a message indicating whether or not the exam was passed. Assume that 60% is the minimum passing grade.
9. What are the values of the following expressions if x is 10, y is 12, and z is 15?

   a) `z / x > y / x`

   `true`

   __(false if all are declared integers)_____

   b) `z + y % x`

   __17_____

10. What values do the assignment statements below assign to the type bool variable junior, if credits is 63, probation is 0, and gpa is 1.94?

    a) `junior = (credits >= 60) && !(probation && (gpa >= 2.0));`

    ______true_____

    b) `junior = (credits >= 60) || (!probation) || gpa >= 2.0;`

    _____true_____

11. Trace (ie write the line numbers of the statements in the order that they are executed) the execution of the loop below for an input of 32.

```
1  num1 = 1;
2  cout << "Enter a number=> ";
3  cin >> num2;
4  while ((num2 % 13) != 0) {
5     cout << num1 << "  " << num2 << endl;
6     num1 += 1;
7     num2 -= 3;
8  }
9  cout << num2 << " is divisible by 13." << endl;
```

1_2_3_4_5_6_7_8_4_5_6_7_8_4_9

12. Write a code fragment that adds up all the data in a file of numbers accessed by ifstream variable in and displays the result. Stop adding numbers when bad data or end of file is encountered. Hint: use a while loop.

```
double value;
double sum=0;
bool notdone=true;
while (notdone){
   in >> value;
   if (! in.fail())
      sum=sum+value;
   else
      notdone=false;
}
```

13. What is the output of the program:

```
#include <iostream>
#using namespace std;
double functionA(double x);
int main(){
int a,b;
 cout << functionA(0.5) <<endl;
 a=5; b=6;
 cout << functionA(0.25) <<endl;
```

```
 cout << functionA(functionA(3));
}

double functionA(double x){
int a=3;
int b=4;
return (a/x)*b;
}
```

a) ____24_____

b) ____48_____

c) _____3_____

14. Given the function declaration
    void functionB(double x);
    Explain what is wrong with the statement:
    double y=functionB(2);

void functions do not return a value so y cannot be assigned a value.

15. Give an example of a situation where a void function would be useful.

When the function performs complex output operations

16. What is the output of the following program.

```
#include <iostream>
 using namespace std;
 double functionC(double& x);
 int main(){
 int a,b;
 double x;
 x=0.5;
 cout << functionC(x) <<endl;
 cout << x <<endl;
 a=5; b=6;
 x=0.25;
 cout << functionC(x) <<endl;
 cout << x <<endl;
 }

 double functionC(double& x){
 int a=3;
 int b=4;
 x=double(b)/a;
 return (a/x)*b;
 }
```

a) _____9_____

b) _____1.33333____

c) _____9_____

d) _____1.33333_____

17. Write a program fragment to add up the numbers from 1 to n (declared as an int). Declare and initialize all variables appropriately.

```
int sum=0;
int count=0;
while (count < n){
   count=count+1;
   sum=sum+count;
```

```
}
```

18. Write a program fragment to read in and integer n (declared as an int) and print out whether that number is even or odd. Declare and initialize all variables appropriately.

```
cin >> n;
if (n % 2 == 0)
  cout << “The number “ << n << “ is even” <<
endl;
else
   cout << “The number “ << n << “ is odd” <<
endl;
```

19. Write a program fragment to multiply together the numbers all the numbers in a file numbers.txt (in the program's folder). Declare and initialize all variables appropriately.

```
double value;
double product=1;
ifstream in(“numbers.txt”, ios:in);
bool notdone=true;
while (notdone){
   in >> value;
   if (! in.fail())       product=product*value;
   else
      notdone=false;
}
```

20. Write a program fragment to read in integers from the keyboard until a nonpositive number is entered and print out all the odd numbers entered.

```
Int num=1;
while (num > 0){
    cin >> num;
    if (num > 0)  && (num % 2 > 0){
       cout << num << endl;
    }
}
```