Midterm 1

CS 1324, Fall 2017

Name (printed legibly): _____

Student number: _____

Integrity Pledge

On my honor, I affirm that I have neither given nor received inappropriate aid in the completion of this exercise.

Signed: _____

Do not write on the back of pages.

Answer all programming questions in Java. Unless otherwise indicated, each part of a problem is worth the same number of points. Show your work to receive partial credit.

Pay careful attention to whether the question asks for a code fragment or a complete program. Do not write a whole program when you are asked for only a few lines of code.

Also pay attention to whether you need to get input from a user or not. When you do not need to get input, the problem will say something like "you may assume that the variables' value was set somewhere else".

Pay careful attention to distinctions like int versus double and String versus char.

Try to move through short problems quickly to leave you sufficient time to write programs and code fragments.

You will have fifty minutes to take the examination.

You do not need to use import statements on any code. You may assume that the user enters all data perfectly unless otherwise noted.

You may abbreviate System.out.println as S.o.p., and may abbreviate prompts.

1) (10 points; 2 points each)

Write **a declaration (type and identifier)** to use to store each of the following things. Do not assume that each type is used exactly once.

a) The maximum height a drone is permitted to fly in miles, including partial miles.

b) The user's answer to the question: How many drones do you own?

c) The user's answer to the question: Do you own a drone?

d) The name of the company that sold the drone.

e) The size of the drone, stored as S (for small), M (for medium), L (for large).

2) (10 points; 2 points each) Give the value computed for each expression below. **Pay careful attention to type, especially char versus String and int versus double.** If the expression is not legal, say so.

a) 49 / 10

b) 43 % 12

c) 30 / 10.0

d) 24 / 25

e) "Daily distance " + 23.5

3) (25 points; 5 points each part) Find the value assigned to result by each statement below. Show all intermediate steps to get partial credit. Each part is independent, with the values for any variables starting with the ones given below (do not use the results of a) in b), for example). **If the expression is not legal in Java, say so. Distinguish double and int values.**

int eeny = 4;
int meeny = 13;
double miny = 26.0;
double moe = 24.3;

    a)   int result = eeny – meeny / eeny;

    b)   int result = eeny * eeny % meeny;

    c)   double result = meeny / miny * eeny;

    d)   double result = (int) moe + meeny;

    e)   int result = ((double) eeny + meeny + 1)/ 2;

4) (10 points; 5 points each part) ***Trace the code fragments*** below in the tables at the right.
   Remember to include the initial values in the table.

a)

```
int first = 29;
int second = 35;
if (first + second < 100)
{
        first = 50;
}
if (second < 25)
{
        second = 50;
}
else
{
        first = 100;
}
```

first	second

b)

```
int grade = 7; // read carefully
String school;
if (grade > 1)
{
        school = "primary";
}
else if (grade > 5)
{
        school = "middle";
}
else if (grade > 9)
{
        school = "secondary";
}
```

grade	school

5) (15 points; 5 points each part) Sales taxes vary from state to state. In some states, groceries are exempt from sales tax. Some states allow cities to have a sales tax. And state tax rates on income and property can be different. Suppose you are trying to figure out which city/state actually collects more taxes: Ann Arbor, Michigan or Norman, Oklahoma. The table below summarizes the tax rates.

State, City	State tax groceries	State tax on non-groceries	State income tax	City tax groceries and non-groceries	City property tax
Norman, Oklahoma	6.5%	6.5%	7%	2.5%	1.5%
Ann Arbor, Michigan	0	6.5%	9%	0	6%

Use the variables below. The values of all of these variables were given elsewhere.
double groceriesDollars;
double nonGroceriesDollars;
double incomeDollars;
double propertyValueDollars;

a) Declare variable(s) and write line(s) of code for the total amount of taxes you will pay in Ann Arbor.

b) Declare variables(s) and write line(s) of code for the total amount of taxes you will pay in Norman.

c) Write an if/else statement that prints out either "Norman has lower taxes" or "Ann Arbor has lower taxes" depending on which amount of taxes calculated above is lower.

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6) (30 points) Write ***a complete program*** that keeps track of expenses for a pilot donating his time to Operation AirDrop. Operation AirDrop takes donated goods and flies them into disaster areas before trucks are able to get through. They have been busy lately. The cost of an Operation AirDrop flight has three pieces: the cost of the plane, the cost of the gasoline, and the cost of the pilot. The cost of the plane is determined by the number of hours it flies. The plane rents for $115.00 per hour, and does not include gasoline. The gasoline needed for this plane costs $42.50 per hour. The pilot costs $50/hr, but the number of hours is 4 more than the length of the flight to pay for the time it takes a pilot to plan the trip. The plane flies 85 miles per hour. The plane carries 455 pounds, including the weight of the pilot.

Write a program that allows the user to enter the number of miles to be flown and the weight of the pilot and gives the cost of the plane and the number of pounds of donated goods that can be delivered.

Example:

Suppose that the flight is 500 miles with a 175 pound pilot.
The number of hours flown is 500/85 = 5.88 hours.
The cost of the plane is 5.88 * 115 = 676.47
The cost of the gasoline is 5.88 * 42.50 = 250
The cost of the pilot is (5.88 + 4) * 50 = 494.11
Therefore the total cost is: 676.47 + 250 + 494.11 = $1,4
The flight can take 455- 175 = 280 pounds of supplies.

A sample run of the program is shown below (italicized words were entered by user).
```
How many miles is your flight?
500
How much does the pilot weigh?
175
The trip will cost: $1420.5882352941176
The flight can take 280 pounds of supplies
```

You must use comments to explain your code. You must declare and use at least one constant in your code.

Please start code on the next page

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