types are declaring
set of objects with of particular type
the code defining the class

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CSC110 Final Exam Part 1

Vocabulary - 1 pt each

Use the following words to fill in the blanks in this section. Note: you can use words more than once, you may need to pluralize the words, and you will not use all of the words

Algorithm	~~Assembly language~~	BigInteger	Compiler
Constant	~~Constructor~~	double	Getter
~~High-level language~~	Interpreted	Keyword	Mantissa
Method	Naming Convention	null	Object
Parameter	~~Precedence~~	~~Primitive type~~	Return Type
Runnable	~~String~~	Target Machine	~~Typecast~~

1. A sequence of characters is called a String.
2. If the compiler knows how much space a type requires, that is a Primitive type.
3. Objects get created by methods called Constructor.
4. You Typecast a value when you want to force it to be a different type.
5. When you are being the machine and evaluating an expression, it is import to pay attention to the order of Precedence of operations to know which one to do first.
6. An Assembly language is specific to one target machine while a High-level language can be compiled to run on many different target machines

Code Constructs

7. (1 points each) What type of statement do you use for each of these situations:
   (a) to create a variable <type><variablename>; ex. int snow;
   (b) to give a variable a value <variablename> = <value>; ex. snow = 2;
   (c) to choose to do something or not do it if (<conditional>){ }
   (d) to do something more than once for(<type><variablename> = <value>; <conditional>; <increment>){ } while(<condition>){ }
   (e) to allocate space <type><variablename> = new <type>[<size>]
8. (2 points) What is an instance variable?

A variable declared at the beggining of a class, usually with a visibility modifier of private.

9. (4 points) Write the code to declare a variable named var1 that can hold a real number and give it the value 42.3

double var1 = 42.3;

10. (2 points) How do you know a method is a constructor?

When it has the same name as the class it is in.

Be The Machine

11. (4 points) Draw the memory diagram for the following code snippet

```
int x;
double[] x = new double[5];
x[3] = 42;
```

x[0]

x[0 , 0 , 0 , 42 , 0]
0 1 2 3 4

12. (4 points) What is the output from this code snippet?

```
for (int i = 3; i <= 5; i++)
{
        for (int k = 4, k > 0; k = k - 2)
        {
                System.out.print(i + ", " + k);
                if (i == k)
                {
                        System.out.println("    SAME!!!!!");
                }
        System.out.println();
        }
}
```

i[3 4 5

k[4 2 0 4 2 0 4 2 0

output

3, 4
3, 2
4, 4
SAME!!!!!

4, 2
5, 4
5, 2

For the next few questions, suppose we have the following class declaration

```
public class PerfectThing
{
        private int clean;

        public PerfectThing(int hold)
        {
                clean = hold;
        }

        public int getTheMagic()
        {
                return hold * 42;
        }

        public void setClean(int nextClean)
        {
                clean = nextClean;
        }
}
```

13. (4 points) Draw the memory diagram for this code snippet

```
PerfectThing x = new PerfectThing(2);
PerfectThing y;
y = x;
y.setPerfectThing(-1);
```

name	hold
x	2
y	-1

PerfectThing x [2]

PerfectThing y [x -1]

CSC110 Final Exam Part 2

Vocabulary - 1 pt each

Use the following words to fill in the blanks in this section. Note: you can use words more than once, you may need to pluralize the words, and you will not use all of the words

Annotation	Benchmarking	Best case analysis	Big-Oh
~~Border Case~~	~~Count-Controlled Loop~~	DeMorgan's Law	Early Exit Condition
~~Lifetime~~	Method Variable	Nested Conditional	Response Time
Scope	~~Selection Sort~~	Sentinel-Controlled Loop	Short-cutting evaluation
~~Sorting Problem~~	TDD	~~this~~	Worst Case Analysis

1. We focus our tests on border cases because that is where bugs are most likely to occur
2. The time during which a variable exists in memory is called lifetime
3. We generally use a for loop to implement a count-controlled loop
4. Selection Sort is one algorithm that solves the Sorting Problem
5. When we need to distinguish an instance variable from a local variable with the same name, we use the keyword this.
6. Sometimes, the compiler will skip the computation of part of a conditional because it knows that the value of that conditional won't change. We call this Shortcutting evaluation

Short Answer

7. (4 points) Suppose you are building a system that holds five values in an array. What are your border cases?

   The beginning and the end of the array (index 0 and length-1)

8. (1 points each) What type of statement do you use for each of these situations:
   (a) choosing between two possible options if
   (b) count-controlled loops for
   (c) sentinel-controlled loops while
   (d) [redacted]
   (e) marking a method as a test @Test
   (f) marking a method so it is run before each test in a test class @Before

9. (4 points) Explain why scope is a compile time issue while lifetime is a runtime issue.

Because scope is how much the variable can see, while lifetime is how long it remains in the system.

Code Constructs

10. (1 points each) For each of the following, write "yes" if the second comparison will be executed and "no" otherwise. Assume you have these variables:

Variable	Type	value
x	int	x = 42
y	double	y = 3.14159
a	int[]	a = new int{3, 4, 5}
s	String	s = "This is my " + x

(a) ((x == 42) && (y <4)) yes

(b) ((a.length == 4) && (x == 42)) no

(c) ((s == "This is my 42") | | (y <4)) yes

(d) ((y <a[1]) | | (x == 42)) yes

11. (2 points each) Define what each of the following String methods does

(a) charAt(i)

finds the character at index i in the string

(b) substring(i)

looks at the string from the i index to the end

(c) substring(i,j)

looks at the string from the i index to the j index

(d) length() give me the units of the result

gives you the int length of the string.

12. (3 points) What is the difference between == and the equals() method when we are comparing objects? == checks to see if the values point to the same position in memory, while .equals() checks to see if they contain the same stuff. Use == for numbers and .equals() for strings and chars.

Sorting

13. (4 points) Which sorting algorithm would use the most swaps in the average case?

insertion Sort

14. (4 points) Show the swaps made by Insertion Sort on this data: 4, 8, 10, 3, 6, 12

4 8 10 3 6 12

4 8 3 10 6 12

4 3 8 6 10 12

4 3 6 8 10 12

15. (4 points) Explain why Insertion Sort's run-time depends on the ordering of the data while that is not true for the other two algorithms we studied?

Because its best case runtime is O(n). If it only has to move something once, but its worst case runtime is $O(n^2)$

CSC110 Final Exam Part 3

Vocabulary - 1 pt each

Use the following words to fill in the blanks in this section. Note: you can use words more than once, you may need to pluralize the words, and you will not use all of the words

Ancestor	Check Digit	Class Diagram	Datamining
Exception	~~extends~~	Feature Selection	~~Frame Bit~~
Inheritance	~~Is-A~~	Method Signature	~~Overload~~
~~Override~~	~~Parity Bit~~	Parent Class	Polymorphism
Prompt	~~Scanner~~	Subclass	~~Substitution Principle~~
Super Class	throw	throws	Token
try/catch	Two-Dimensional Array	UML	

1. We mark a class as being a subclass using the keyword extends.
2. One of our encoded zip codes has five Parity bits and two frame bits.
3. We use the Scanner class to get input from a user and to read from a file.
4. An object of the child class Is-A object of the parent class because they must obey the Substitution Principle
5. Overloading a method is where we have two methods with the same name in the same class while Overriding is when a child class has a different implementation for a method than the one it should inherit from its parent class.

Short Answer

6. (2 points) Explain why 7+2 1010 is 9 in zip codes.

because the first bit is equal to 7 and the third one is equal to 2 so 7+2=9

7. (3 points) There were two ways that we could have encoded 7: 1000 or 0111. Which did we pick and why?

We picked 1000, because it was the least likely to have an issue.

8. (3 points) If we want to read a text file, where do we put it?

our src folder

9. (4 points) What is the difference between the keywords throw and throws?

throws tells the method that it may throw an exception while throw is when it does throw it (throw new exception)

10. (3 points) How do we test to make sure that an exception gets thrown?

@Test (expect == exception.class)

11. (4 points) If x is the following two-dimensional array, what is the output from the following code?

[row] [col]

x:

0	1	2	3	4	
4	5	3	7	4	0
8	4	7	4	2	1
8	4	4	5	6	2
1	3	2	5	9	3
4	2	6	8	3	4

```
for (int i = 0; i<5; i++)
{
        sum = sum + x[i][3];
}
System.out.println(sum);
```

sum[7 11 16 21 29]

i[0 1 2 3 4 5]

Output
29

12. (2 points) What does it mean for a class to be abstract?

that it cannot be run directly because it is a superclass

13. (2 points) Why would we declare a class to be abstract?

to use it as a base for subclasses but give some base information.

14. (2 points each) Suppose our rigged constructor was passed this information:

```
String[] ingredients = {"salt","rosemary","pepper","beef",
        "pepper","thyme","eggs"};
String[] cuisines = {"italian","good food",
        "korean","icky food", "mexican","homecooking"};
String[] recipeCuisine = {"good food", "good food",
        "korean","korean","italian","homecooking"};
boolean[][] recipeIngredients =
{{true, false, true, false},
        {false, true, false, false},
        {true, true, true, true},
        {true, false, true, true},
        {false, false, false, false},
        {true, false, false, true}};
```

```
RecipeData r = new RecipeData(cuisines, ingredients,
recipeCuisine, recipeIngredients);
```

What would be the value of each of the following?

(a) r.getNumberOfSamples()

6

(b) r.getNumberOfCuisines()

6

(c) r.getNumberOfIngredients()

7

(d) r.getRecipeIngredient(0, 0)

true

(e) r.getRecipeIngredient(3, 1)

false

(f) r.getMutualInformation(1, 3)

4

15. (3 points) What is inheritance?

When a subclass gets its information from a superclass, it inherits it.

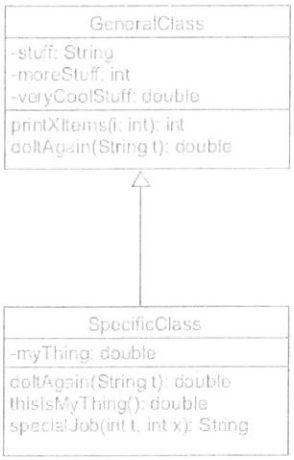
16. (3 points) Explain why you could not run TestLifeForm.

because it was an abstract class

17. (2 points) If we can run TestLifeForm, why did we build it?

So that we could test the shared interaction between human and zombie

The following questions refer to this class diagram:



18. (2 points) In this diagram, which class inherits from the other?

Specific class inherits from General class

19. (2 points) Which method is overridden by the child class?

doItAgain

20. (2 points) If we create an instance of GeneralClass, how many instance variables will it have?

three

21. (2 points) If we create an instance of SpecificClass, how many instance variables will it have?

four

22. (2 points) How many test classes should you create if you were building these classes?

five