## **Theory Questions/Worksheet**

The following should be put into a PDF with your names as the title (what shows at the top tab when viewed), and the PDF file should be named “lastName1 lastName2 …” Your total document will likely be 10-20 pages. The sections are based on the 4 sets of theory that will be discussed in class. I ***strongly advise*** completing them immediately after that theory lecture set in class. Treat this like a worksheet and you ***must* follow the format** below with default margins and 12 point Times New Roman font or similar. I suggest copying and pasting to start.

**Names:** Timothy Adcock, Ashlyn Davie, Nathaniel Fagrey, Jessica Roberts

**Language:** Dart

**Coding environment**:

OS: Windows 10

Dart Version: 2.10.2

Dart compiler was used

### **Section 1: Comparison to C++, Java, Python, and/or Scala**

1. **What is the language’s philosophy?**

**The philosophy of Dart is the ability to create a wide range of applications that will run on any device from a single code base. It brings in C-style syntax with an Object-Oriented Paradigm to make it a comfortable choice for many developers.**

1. **Compare and contrast your language in terms of the location it is used.**

Dart is mostly used in mobile application development, allowing to develop for multiple mobile platforms (iOS and Android) without needing to change language or development environment. Since Android and iOS are generally written in different languages Dart allows a single point of development that may speed up development time.

1. **Compare and contrast your language in terms of where it excels and where it fails**
   * **Excels**

Great for mobile applications development. Dart is also very stable (thanks to Google). The familiar C-style syntax mixed with memory management and dynamic type appeals to a wide range of developers.

* + **Fails**

May lead to difficulties since it does require

1. **Compare and contrast your language in terms of Portability, Simplicity, Orthogonality, AND Reliability.**
   * **Portability**

Dart is great at portability, since it allows for development for many platforms (ARM32, ARM64, x86\_64, and JavaScript). Since Dart also has Just in time and ahead of time compilation it can be treated as an interpreted language for fast prototyping and an optimized compile language.

* + **Simplicity**

Dart is similar to C++ so it isn’t very difficult to learn, but if someone only knew learning languages like Python it may be difficult to learn. Some aspects of Dart are difficult to understand such as the concept of synchronous and asynchronous ideas, but those are not required to know when programming in Dart.

* + **Orthogonality**

Dart is pretty good at keeping orthogonality in check since keywords are really only used for one task. Tasks in Dart generally have 2 ways of doing something, this is because of the languages a/synchronous ways of doing things.

* + **Reliability**

The language is still relatively new but since it has Google backing it Dart is reliable.

### **Section 2: Syntax, OOP**

1. **Write the EBNF for one type of assignment expression in the language with all tokens defined.**

DIGIT = ‘0’ .. ‘9

HEX\_DIGIT = ‘a’ .. ‘f’ | ‘A’ .. ‘F’ | DIGIT

HEX\_NUMBER = ‘0x’ HEX\_DIGIT+ | ‘0X’ HEX\_DIGIT +

EXPONENT = (‘e’ | ‘E’) (‘+’ | ‘-’)? DIGIT+

NUMBER = DIGIT + (‘.’ DIGIT +) ? EXPONENT? | ‘.’DIGIT + EXPONENT?

1. **How does the language handle file/object/class extension/etc. (single inheritance, interfaces, root object, class OOP, prototype OOP, other OOP, file extension, plugins, piping, module linking, etc.)?**

Dart has single inheritance with classes and multiple inheritance interfaces.

1. **How does the language handle module/namespace/packages/etc., and what is the scope operator?**

Dart does not have an equivalent of a namespace but rather uses libraries which are a collection of dart files. You must import a library to use them.

1. **Does the language allow function overloading (name repetition), function redefinition, and/or function overriding? Give example syntax if it does.**

Dart does not allow for overloading or redefining but does allow for overriding but only within classes.

class Parent {  
 void func1(String a){ print("value of a ${a} first");}  
}  
class Child extends Parent {  
 @override  
 void func1(String a) {  
 print("value of a ${a} second");  
 }  
  
}

### **Section 3: Binding, Type system, and data type range**

1. **Is the language static or dynamically typed? Give example syntax in code.**

Dart is both Dynamically and Statically typed, so you can define what a variable is for sure or let the compiler decide.

double type1 = 1.0;  
var type2 = 1.0;  
print("double type1 = 1.0; is ${type1.runtimeType}\n var type2 = 1.0; is ${type2.runtimeType}");

This will output

double type1 = 1.0; is double  
var type2 = 1.0; is double

1. **Is the language static or dynamically scoped? Give an example in code.**

Statically Scoped

Function makeAdder(int addBy) {  
 return (int i) => addBy + i;  
}

void main() {

// Create a function that adds 2.  
var add2 = makeAdder(2);  
  
// Create a function that adds 4.  
var add4 = makeAdder(4);  
  
assert(add2(3) == 5);  
assert(add4(3) == 7);

}

1. **How is the language read (left to right, in-fix, pre-fix, etc)? Give an example in code or in a diagram. (max of 3 examples).**

Code is read left to right with in-fix notation.

double three = one + two;

1. **What are the built-in data types and their ranges? (list a max of 10)**

Int: -2^53 and 2^53 non decimal number

Double: Follows the IEEE standard

Bool: Either True or False

String: A sequence of UTF-16 units (Doesn’t say if there is a max length)

List: Has two types one is fixed length where the length cannot be changed and a growable list that can grow in length, can contain any object.

BigInt: An arbitrarily large integer.

Num: An integer or floating-point number(Double).

### **Section 4: Control flow, Function, specialties**

1. **What are the selection and repetition structures of the language, and what is their syntax?**

Selection: If statement

if (name == "Dart"){}

Repetition: For loop

for (var line in lines) {}

While loop

while ((m = stdin.readLineSync()).toLowerCase() != "end"){}

1. **Are functions pass-by-value, pass-by reference, etc.? Give example syntax in code.**

Similar to Java, Dart is only by value when it comes to functions.

1. **Describe at least two of the language specialties.**

Specialty one:

<answer here>  
Specialty two:  
 <answer here>