Introduction to **WPILib** (with Java)

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This test will evaluate the familiarity of the WPI Libraries, which is commonly used in numerous FIRST®robotics competitions.

The following topics will be on this test:

- Robot Program Frameworks (`TimedRobot`, `IterativeRobot`, `SampleRobot`, `etc`.)
- Methods from IterativeRobotBase (`robotInit()`, `autonomousPeriodic()`, `etc`.)*
- Setting driver ports
- Commands*
- Sensors*
- RoboRIO
- TalonSRX®*
- Deprecation and Annotations
- Package Names
- Programming Habits and Conventions

* Starred items are extremely important in programming a robot

DO NOT BEGIN UNTIL INSTRUCTED TO DO SO

Use this page for scratch work if desired

Scratch work will not be graded

PART ONE: Multiple Choice (20 pts)

Instructions: Choose the correct solution to the problem, there is only one correct answer for each problem unless otherwise stated.

1. The method `robotInit()` has what purpose? (1 pt)
   (a) for code that will start up the robot
   (b) this method should not be modified and left as is
   (c) for any initialization code when the robot is first started up
   (d) for variables that need to be initialized
   (e) for code that needs to be called repeatedly
2. The method `autonomousPeriodic()` has what purpose? Choose the best answer. (1 pt)
   (a) for code that will start up the robot, from the auton period
   (b) this method should not be modified and left as is
   (c) for any initialization code when the robot is first started up
   (d) for variables that need to be initialized in the auton period
   (e) for code that needs to be called repeatedly in auton only
3. Which class should hold the driver controller ports? Select 2 answers. ($\frac{1}{2}$ pt each)
   (a) OI.java
   (b) Robot.java
   (c) RobotMap.java
   (d) .classpath

4. List all the methods that we can override from `TimedRobot`. One bonus point will be awarded for each correct description of the use of said method. (11 pts)

Ex: method name	time period	Init/Periodic
	auton	Init
autonomousPeriodic		
	disabled	
	disabled	Periodic
	robot	
	teleop	Init
		Periodic
testInit	test	
	test	

5. Which is an actual Talon® Control Mode? (1 pt)

   (a) Percent Voltage

   (b) Position Opened-Loop

   (c) Voltage Usage

   (d) Velocity Opened-Loop

6. Which best defines what a Talon® Control Mode is? (1 pt)

   (a) a joystick

   (b) a B/C CAL button

   (c) firmware that calculates the motor-output

   (d) allows a "Robot Controller" to specify/select a target value to meet

7. How many Trajectory points can a Motion Profile Buffer hold? (1 pt)

   (a) 32

   (b) 64

   (c) 128

   (d) As many as you want it to

8. What does PID stand for? One bonus point will be awarded for the name of the known value F which is supplied to the output as a guesstimate so the PID only has to make minor corrections. (1 pt)

   (a) PID, Is, Differential

   (b) Proportional, Integral, Derivative

   (c) Point, Intersection, Dimensions

   (d) PID does not stand for anything

   Bonus Question:

   - name of the word that starts with an F is: _____

9. What method in `Robot.java` is most likely to hold the following code? (1 pt)

```
drivetrainSubsystem = new DrivetrainSubsystem(); // of class DrivetrainSubsystem
elevatorSubsystem = new ElevatorSubsystem(); // of class ElevatorSubsystem
intakeSubsystem = new IntakeSubsystem(); // of class IntakeSubsystem

oi = new OI(); // of class OI
```

   (a) `robotPeriodic()`

   (b) `testInit()`

   (c) `autonomousInit()`

   (d) `teleopPeriodic()`

10. Any command that you create must extend which of the following classes? (1 pt)

    (a) `NewCommand`

    (b) `CommandInit`

    (c) new commands don't have to extend any other class

    (d) `Command`

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Section II: Free Response (20 pts)

Instructions: Write the most efficient solution to the following methods.

11. Write an "IRSensor" class that:
- is in the org.usfirst.frc.team1923.robot.team1923 package
- imports edu.wpi.first.wpilibj.AnalogInput from wpilib
- has variables for the portNumber and the distance in the class
- has a constructor that accepts the analog port number and sets it in the class
- has a getDistance() method that returns the distance (double)

Use pencil if possible. (11 pts)

```
// put package and import(s) below




public class IRSensor {

// class variables



// class constructor









// getDistance() method




}
```

12. What class do we have Robot.java extend? What other class(es) could it extend? (3 pts)

13. What should you do if you see that a class that you were planning on using is deprecated? (3 pts)

14. Briefly describe what the WPI Robotics library (WPILibJ®) is. How is it used? (Explain in 3 meaningful sentences for full credit) (3 pts)

Extra Credit:

15. How should whitespace be formatted? (1 pt)

    (a) 1 tab

    (b) 4 spaces

    (c) 2 spaces

    (d) 2 tabs

END OF EXAM