1) Create a new Eclipse project titled  
icom4015f06

2) Create an  
package to hold all the classes created for this problem set.

3) Design a  
Java class to represent complex numbers. Provide accessors to extract the imaginary part, the complex part, the magnitude and the phase angle. In addition provide methods to add, subtract, multiply and divide complex instances of the class.

4) Design a Junit  
TestCase to test the  
class as comprehensively as possible.

5) Design a  
Java class to represent hexadecimal numbers (base 16). Hexadecimal numbers consist of digits 0-9 plus letters A-F to represent values from 10-15 correspondingly. For instance, the number FF represents 15 * 16^1 + 15 * 16^0 which equals 31. Provide a constructor accepting a String representing the number and another constructor accepting a long integer representing its decimal value. Provide a  
method that returns the String representation of the hexadecimal number. Provide methods to add, subtract, multiply and divide (quotient) hexadecimal numbers. Provide a method to return the binary representation of the number.

6) Design Junit suite to test the  
class as comprehensively as possible.

7) Design a  
Java class to represent a die. The class should have a null constructor and a  
method that returns the outcome of a single roll of the die.

8) Design Junit suite to test the  
class. How would you go about testing methods that return random outcomes?

9) Design a  
class with several static methods to conduct experiments rolling dice using the  
class developed in exercise 5. Provide a method  
to compute the fraction of attempts that a single die rolls a six in  
 attempts. Provide a method  
to compute the fraction (%) of attempts that a roll of five dice yields a full house. Conduct other experiments of interest to you. What can this teach you about probabilities?

10) Design a  
class to represent the value of an alternating current or voltage. The class should use the  
class developed above. Design a  
class to test your class.

11) Design  
,  
and  
classes to represent ideal electrical circuit components. Each class should have  
methods to return the  
object that represents the current that flows thru the component when a voltage is applied, or the voltage change across the element when a current is flowing through it. For each component design a Junit testing class.

You should hand a jar file with all your classes by email to  
icom4015-profs@ece.uprm.edu by the due date.