Full Name: _____________________________

*Please answer each question only within the space provided for each question. All questions have equal points.*

1. Mention five code and/or design smells you have seen. Explain why these are smells and how you’d fix them.

2. "Polymorphism and Encapsulation are key to realizing Extensibility." What does extensibility mean here? Why should we care about extensibility?
3. The four commandments of simple design are “Pass all tests,” “Clear, expressive, & consistent,” “Duplicates no behavior or configuration,” and “Minimal methods, classes, & modules.” What’s the overarching reason that these principles collectively (not each one of them individually) are critical to follow.

4. We’re working on a reminder app. The logic we’re programming sets a time on a timer. When the timer notifies, through an event, that the set time has been reached, our logic will perform an action. A fellow programmer in our team tells us since the timer may take a long time to raise that event our code can’t really be unit tested. Is the fellow programmer correct or are there ways to unit test above logic and the resulting action? Explain.
5. What’s the difference between design by contract and design by capability? What types of languages generally support each one of these?

6. What is an invariant when it comes to a class? What helps preserve the invariants?
7. Mention at least five benefits of Test Driven Development. Explain each of them.

8. What is a “Truck Factor” and what are some of the ways to mitigate that on projects?
9. What are multimethods? How do they differ from polymorphism? How can they contribute to better extensibility? Give an example.
10. Draw UML class diagram (keep the number of dependencies low) for the relationship described below.

An agency keeps track of companies and folks who do work for the companies and has asked you to model that information. There are two types of companies, for profit and non-profit. A company has several people working for it. It has employees and consultants. Some are full-time, others are part time. A consultant may work at different companies at the same time. An employee may be full-time at a company and part time at another. Each person takes on different roles. Each person has a manager who supervises that person's work at that company. One additional details, a company may have multiple locations and these folks doing work for the company are associated with only one location.