HW 1

"I pledge my honor that I have abided by the Stevens Honor System."

What are Empirical Relations?

Empirical Relations are a relationship derived or based upon experimentation, which differs from mathematical, theoretical, or physical relations. It is based on observation, not theory or opinion.

An example of an empirical relation given in lecture is "The average number of defects per KLOC (thousand lines of code) is 2.4", while a physical relationship is given the example, F=M*A.

What is the difference between direct and indirect measures?

Direct and Indirect Measures are ways to measure specific entities and attributes. Using **direct** measures is when we can measure an attribute directly, meaning they can be expressed in such ways as one symbol or number. Direct measures can be used for attributes such as "the number of modules in a system or the number of open trouble reports." Not everything can be directly measured and thus indirect measures are needed to measure certain attributes. **Indirect** measures, referred to as metrics, are more complex and can require some calculations or combinations of measurements. Indirect measures are used to measure complex attributes and concepts such as such "productivity, quality, or ability to write good code."

Direct Examples*:*
- *Number of defects fixed in a release*
- *Height, weight, IQ, age, ...*
- *Lines of Code written this week*

Indirect Examples*:*
- *Average Time to Fix a Defect = (Total Time Spent)/(# of Defects Fixed)*
- *College Entrance Score= (SAT Scores/160+GPA*2+ # alums+ # of ec activities)*
- *Good Code Index = Lines of code/week–10*average # integration testing bugs/week*

What is the difference between accuracy and precision?

Accuracy and precision are both a quality of measure but indicate different things for measurements. Accuracy is a measurement of closeness to an actual value trying to be achieved and can be determined by a single measurement or event. Accuracy is how a result compares to a target and clearly defined attributes and metrics are necessary to do so. Precision is the ability to be reproduced and multiple measurements over a period of time are usually necessary to determine precision. Precision is measuring how multiple results compare to each other. An example of this difference can be seen in "significant digits" in math. More digits is more precise but does not ensure accuracy to the correct answer. Measuring precision is helpful when trying to avoid repeat mistakes and when establishing a process for reproducing a successful result.

ex:

- *getting consistent results (precise) moving away from target goal (accuracy), may indicate an error*