

Software Verification & Validation

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Assignment #2

Adapted from work by Peter Heusch

Exercise 2.1: Terminology

For each of the pairs of concepts listed below, explain differences and similarities. When do we use/need one and when the other?

- Random Variable—Probability Distribution
- Standard Deviation—Variance
- Reliability—Availability

Exercise 2.2: Dice

This exercise is about non-standard dice. They have 6 faces and when rolled they show all six sides up with equal probability. A die labelled with the numbers 1 – 6 is a standard die. Our dice A , B , C , D have sides labelled as follows:

A : all sides 4

B : four sides 2 and two sides 8

C : three sides 1 and three sides 7

D : four sides 6 and two sides 0

- Rolling means to evaluate a random variable. For each of the dice calculate the expected value, the variance and standard deviation.
- Calculate the expected value and variance of $A + B + C + D$.
- Two players pick a different die each. They both roll their die, the player who has rolled the higher number wins. For each possible choice of dice, calculate the winning probabilities of the players.
- Alice and Bob play the following game:
 1. Alice chooses a die.
 2. Bob chooses a die.
 3. Five times they both roll their die. Each time, the higher rolling player receives a point.
 4. The game is won by the player who has received more points.

Given that Bob plays a reasonable strategy, what is his chance of winning the game?