Computation Theory Notes:

Chapter 0

**Question 0:**

**If a programmer understands the limitations and capabilities of a computer, they can more efficiently work to solve their problems.**

**Question 1:**

**The set *A* consists of all numbers between (and including) 1 and 30 that are divisible by 3.**

Enumerating the element:

A = {e1, …, en}

Property of the element

**Question 2:**

**A U B = {1, 2, 3, 4, 5, 6, 10}**

**A ∩ B = {10}**

A \ B is the same as A minus the elements of B

Sets are unordered, but sequences have a specified order.  
Sets are defined with parentheses: (7, 24, 38, 299)

Power Sets are a set of the original set and all of its subsets

**Question 3:**

***P*{6, 7, 8} = { {ᴓ,} {6} {7} {8} {6, 7} {7, 8} {6, 8} {6, 7, 8} }**

**Question 5:**

**A3 = All binary numbers from 0 to 7**

Functions take an input and produce an output

Domain is the value of inputs

Range is the value of outputs

**Question 6:**

Graphical user interface, application

Description automatically generated

A graph is a tree if it is connected and has no simple cycles

Leaves are nodes with no children / they are the highest degree

**Question 7:**

We did it on the other assignment

Directed path: path where all arrows point in the same direction.

*Alphabet:* Non-empty, finite set

*Symbols:* Members of the alphabet

We use Greek letters to designate alphabets

Strings of characters are fundamental building blocks in CS

*String*(over an alphabet): finite sequences of symbols from that alphabet

*Language:* Set of “acceptable” strings

Assume w = 01001. |w| = 5

|...| is asking for the size of the set inside

If two strings are connected via o, like w o b, it’s a concatenation

Concatenation: combine the strings in order

**Question 8:**

**(ε), (0), (1), (00), (01), (10), (11), (000)**

**Question 9:**

**(P^Q) v (P^R)**

**(P v Q) ^ (P v R)**

**Question 10:**

**X cannot represent a “largest” number, as it would allow for X + 1 to exist and be larger.**

If m and n have no common divisors, one must be odd.

**Question 11:**

**20  one node / one leaf**

**Question 12:**

**n=1**

**1 = 1+1/2**