

- Write a constraint for the below scenario if  $A < 20$  then b value should generate 10 to 30 and if  $a > 50$  then the B value should be 30 to 50 only
- Write the constraint to generate the three unique numbers, without using "unique"?
- write a single constraint to generate the random values for bit[8:0] variable in the below range 1-54 , 127 ,137-166,196-209 & 231-262
- Constraints to have Unique elements in an Array with Size in {5 – 10}
- Write a constraint for 16-bit addr which should contain 9<sup>th</sup> bit as 1
- Write a constraint for 16bit addr which should contain 9<sup>th</sup> bit as 1 but should not have constitutive 1
- Write a constraint for 16bit addr to generate power of 2.
- Write a constraint for apb slave select signal?
- Write a constraint without an inside function to generate variable value within the range of 34 to 43?
- Multi bit vector, generate value with only one bit in vector being '1'
- Declare a Queue, Fill with 20 random values between 200 to 300, no repetition
- Generate a random number between -5 to -15 using **system tasks**.
- Generate a,b,c,d in such a way that all of them take unique values, but all of them inside 10 to 20 only.
- Soft constraint using eth\_pkt where constraint len is 42 to 1500 and inline constraint with 2000 len.
- Explain Inline constraints using packet type and payload length example.
- generate random number between 100, 200, which is a multiple of 5
- Populate a queue with 10 elements, each element inside 100 to 200 and must also be a multiple of 5.
- randomize only one variable in a class
  - use rand\_mode(0) to disable
  - randomize(variable\_to\_randomize)
  - We can print rand\_mode() of variable also using \$display
- random number between 5 to 10 with weight of 5, -5 to -15 with weight of 10
- Generate a random real number between -2.35 to 4.32
- Generate a random real number between -2.35 to -4.32

## MEDIUM

- The constraint for an array of 10 elements in which the first 5 elements are in increment in nature and the next 5 elements are in decrement nature.
  - All elements in range of 50 to 100.
  - All elements should be multiple of 5
- write a constraint to store odd data in even addr and even data in odd addr
- write a constraint to generate unique even no. on even location & unique odd no. on odd loc
- Write a constraint for an array of numbers such that the size of array ranges from 16 to 32 elements, and even index locations should have odd numbers and odd index locations should have even numbers, numbers range is between 16 to 127
- Write constraint for randomly generating an array of numbers with size 20, sort in ascending order without using inbuilt sort method, and sum of all array elements should be 300.
- write the constraint to gen. this seq. 0 1 0 2 0 3 0 4 0 5 0 6 0 7 0 8 0 9 0 1 0 2 0 3 0 4 0 5 ... in array the same for a vector variable.

- 0 0 1 0 0 2 0 0 3 0 0 4 .... 0 0 9 0 0 1 0 0 2...
  - Write a constraint to generate Real numbers from 3.5 to 5.5
  - Write a constraint for 10101010.. sequence
  - Given a 16-bit address field as a class member, write a constraint to generate a random value such that it always has 9bits as 1 and 111 or 000 sequences should not occur in that address.
  - Randomize a value with even and odd values alternatively.
  - Without using randomization or rand keyword, generates array of random values.
  - Generate unique elements in an array without using the keyword unique.
  - Constraint to generate 1'bx and 1'bz randomly
    - Use post randomize to assign x and z based on other variable.
  - Write constraint on an array to generate values in ascending order.
  - Write constraint on an array such that even indexed elements are even values, odd indexed are odd values.
  - Write a constraint to generate a pattern 01020304050
    - Declare an array
    - For even index of array, fill 0's
    - Odd index use the i+1/2 relation in foreach loop
  - Factorial of first 5 even numbers using constraints
    - Write a function to calculate factorial
  - Generate an array of random real random number
  - Write constraint to generate pattern 9-7-5-3-1-8-6-4-2-0
  - Write constraint to fill array with value in ascending order
  - Write constraints to randomize only specific bit of a bit vector, others are all 0's
  - Generate a random string whose name is between "pkt1" to "pkt20"
  - Declare 2 array(queue) elements each of size 10, randomize in such a way that 2<sup>nd</sup> array values are 1<sup>st</sup> array value added with 5 for each element.
  - Implement randc behavior using rand
  - Add "size" number of entries to a queue. The entry of queue is randomized between 0 to "size"
  - Write constraints to generate a n bit value such that the number of bits set is equal to number of bits that are zero
  - Write a constraint such that an array of inputs will never be equal and also never equal to the other input when the index is same
  - write a constraint for 3x3x3 array to have unique elements
  - Write constraint for an integer array with 10 elements such that exactly 3 of them are same and rest are unique
  - Constraint to randomize a 100 bit var such that always and only 5 consecutive bits are 1s
1. Question variation: 5-1's and 5-0's repeating pattern
- Constraint to randomize an array such that one specific element picked is always a constant value, say element at index 5 is always 100.
  - write constraint to generate a random number with only 5 bits set and consecutively set for 80% of the time
  - Write a constraint to make sure every even item in an array is even and every odd item is odd.
  - Write constraint such that sum of arr[10] is 100 without using .sum method
  - Write constraint for an integer array with 10 elements such that exactly 3 of them are same and rest are unique

### Difficult

- Write a Constraint for the prime number generation in a given range?
- Constraints on below 2-Dimensional array to have lower triangle matrix

7    0    0    0

11   27   0    0

57   63   92   0

107 117 290 700

- Write a constraint on write and read with following conditions
  - read can be followed by another read on the next cycle
  - write can be followed by another read but not write on next cycle
  - More than 4 read cannot be back to back.
- Write a constraint to generate for the wr\_rd signal which is of 1bit  
00110011001100
- Write constraints to meet the following requirements
  - a. The dynamic array should contain 20 items.
  - b. Out of 20 items, the values of 3 items should be equal to 5 at random positions.
  - c. The values of 5 items must be 10 at random positions
  - d. The values of 8 items must be 15 and the remaining 4 items must be 20.
  - Note: Don't use distribution constraint, as it will not really meet this requirement
- Design has 2 interfaces
  - One Master interface
  - One Slave interface that connects with multiple slaves.
  - Only one slave can be targeted at any time by means of Chip select.
  - BFM will do the design register configuration followed by generating transactions for various slaves to check write and reads to those slaves.
  - Each slave has specific address range from `CSn\_START to `CSn\_END
  - **Need flexible testcases where we can target multiple slaves in the same test**
    - user should be able to decide which specific slave to target
  - Design has multiple(6) slaves connected, slaves connected on CS0 to CS5
  - Each slave has specific address range.
  - `CSn\_START to `CSn\_END with n from 0 to 5
  - Generator and BFM connected to the design on the host(master) interface generates transactions to these slaves. **We want a flexibility** where, we choose which slaves my transactions should be targeted to.
- USB frame generation example
  - Frame consist of packet targeted for different EPs
  - EP are targeted for
    - Isochronous transfers
    - Bulk transfers
    - Interrupt transfers
  - EP can be
    - IN
    - OUT
  - Test case should be developed in such a way that Eps should get selected automatically for given transfer type and direction.

- Constraint to generate Non-overlapping descriptors `typedef struct desc{ s_addr, size}. desc_s;`
    - `desc_s d[];`
    - Number of descriptors in the range of m and n
    - Size of descriptors between a and b
    - Total Memory is N bytes
    - Non overlapping descriptors
  - Write constraints to pick a ball out of 10 different colored balls and that color should not be repeated for in next 3 draws
  - Write constraints to generate MxN matrix with each element with 0,1 and sum of all elements less the MAX\_SUM
  - Write a constraint to divide values of 1 queue into 3 queues so that all 3 queues have unique elements
  - Write a constraint to generate dynamic array of 300 elements. each element can have value 0/1/2/3/4 each of the above values should be present more than 40 times in the array element 0 can be repeated while 1/2/3/4 are not allowed to repeat consecutively ex: 001342.. allowed(0 can be repeated) ex: 0122431.. not allowed(2 is repeated)
  - generate a solved sudoku puzzle
  - For a 8 bit variable if the past randomization resulted in a odd value, the next randomization should be even with 75% probability else be even with 25% probability. Write a constraint
  - Stream of random numbers are getting generated. how to write constraints to make sure most recent four numbers are unique.
1. Write a constraint to generate two dynamic arrays such that array1 size = [6:9], array2 size = array1 size. Array 1 should be assembled in ascending order while array2 should have all the values picked from array1
  1. Write a constraint on a 4 bit variable such that the probability of values being the same on the lower two bits have only 5% chance
  1. write a constraint for generating leap years
  1. a. Matrix size should be randomized with only odd numbered square matrix. b. Each sub square matrix should have only one max element and rest less than max and can be repetitive c. Max elements of each square sub matrix should be unique, mean no two sub matrix should have same max element d. Constraint Should scale up to any size of limited by 32 bit
  1. Write a constraint for a 10 bit variable so that; -> 10% of the time 1 bit in en is high -> 10% of the time 2 bits in en are high ... -> 10% of the time all 10 bits in en are high.
  1. Write a constraint to generate a number which has binary all 1s grouped together
  1. Write a constraint to randomly map elements from an array into N non-empty queues
  1. write code so each element from input\_array appears in output\_queues, no output queue should be empty
  1. The dynamic array size should be 300 and the elements in it can be 0,1,2,3,4,5. Each element should occur atleast 40 times in the array. Also, there shouldn't be 0's consecutively.

1. Write a constraint for distinct adjacent element (adjacent elements should not be the same) in a 2d array (specifically for the boundary elements size of 2d array is  $m \times m$  where  $m$  can be any integer)
2. Write a constraint for a 2d array such that it has a unique max value in each row and that max value should not be equal to any other max value in other rows
1. Generate a parameterized array whose values are equal to a Magic square using constraints
1. How to write a constraint to generate a random value of 10 bits as 1 and no two bits should be next to each other. This should be written without using \$countones.
1. Write SV constraint to limit sum of odd elements of an array to be 30 and sum of even elements to be 60
1. Write constraint for number to be power of 4.
1. Write a constraint that generates Add, mul, sub, nop instructions. Such that no Add instruction is repeated in 3 clock cycles and sub is not repeated in the last 3 valid instructions. Nop is not a valid instruction
1. Write a SV constraint to generate 2  $3 \times 3$  matrices s.t the min value in each matrix is unique
1. Write a SV constraint for a tic tac toe game. Matrix size is  $3 \times 3$ .
1. Write a constraint for square matrix and then rotate 90 counter clock wise
2. Say you have 4 instructions: ADD, SUB, MUL, NOP.
  1. They execute in X cycles, Y cycles, Z cycles, and 1 cycle respectively.
    1. How would you generate a constraint to inject these into a design so that two like instructions don't overlap during the same period of time
    2. Bonus: Is there a way you could generate this without using SV constraints
1. Write system verilog constraints for the eight queens problem? Write system verilog constraints for the Knight's tour problem.