PUFs I (A)
1) Define a physical unclonable function

2) A PUF is defined as a combination of

Multiple choice:
1) Physical layer security refers to all of the following except
a) Secure execution
b) Secure network communication
c) Secure key generation
d) Secure key storage

2) An intrinsic PUF is defined by
a) An entropy source and an on-chip measurement technique
b) An entropy source and the intrinsic properties of the chip
c) An on-chip measurement technique and a mechanism to query the PUF
d) An entropy source and an access mechanism

PUFs I (B)

1) How is a PUF experiment defined?

2) Why is reliability an important property of a PUF?

3) Define regeneration as it relates to PUFs

Multiple choice:

1) Challenging a PUF refers to

a) Applying analog stimuli to obtain an analog response from the PUF

b) Changing temperature conditions to determine if the PUF can reproduce the same response

c) Changing both temperature and voltage conditions to determine if the PUF can reproduce the same response

d) Applying digital inputs to obtain a digital response from the PUF

2) The most important statistical metrics associated with PUFs include all of the following except

a) Uniqueness

b) Randomness

c) Size of the response

d) Reliability

PUFs I (C)
1) For reliability assessment of the PUF, what does it mean to test across all TV corners

Multiple choice:
1) A reliability assessment of a PUF involves all of the following except
a) Testing each of the chips across all TV corners
b) Computing hamming distances between enrollment bitstrings for each of the chips
c) Computing hamming distances between all combinations of enrollment and regeneration bitstrings for each chip
d) Computing hamming distances between the enrollment bitstring and each of the bitstrings generated at each of the TV corners for each chip

2) A uniqueness assessment of a PUF involves all of the following except
a) Computing hamming distances between enrollment bitstrings across all chips
b) Testing each of the chips under enrollment conditions
c) Computing hamming distance between enrollment and regeneration bitstrings for the same chip
d) Counting the number of differences between enrollment bitstrings across all chips

PUFs I (D)
1) Name three techniques that measure the randomness statistical property of bitstrings

Multiple choice:
1) Bitstring randomness can be evaluated by the following tests except
a) Entropy and MinEntropy
b) Interchip HD
c) Counting the frequency of 0's and 1's in the bitstring
d) Counting the frequency of *n*-bit patterns

2) The following is true about MinEntropy except
a) MinEntropy reports the worst case behavior of a random variable
b) MinEntropy analyzes the most frequency occurring pattern produced by a random variable
c) The mathematical description for MinEntropy is -log base2 of max(p_i)) for all pi
d) MinEntropy analyzes the least frequency occurring pattern produced by a random variable

PUFs I (E)
1) Define Conditional MinEntropy

Multiple choice:
1) The following is true for Conditional MinEntropy except
a) Pairs of bits are tested for reliability
b) Pairs of bits are tested for dependencies
c) Zero Conditional MinEntropy is produced with the 2nd bit of a bit pair is completely dependent on the first bit of the pair
d) Pairs of bits are tested for correlations

2) The following is true regarding the p-value in the NIST statistical tests except
a) It measures the strength of evidence against the null hypothesis
b) Large p-values near 1 indicate that the bitstring has very little randomness
c) The computed p-value for a bitstring is compared to a significance level alpha
d) Small p-values near 0 usually result in the bitstring failing the test

PUFs I (F)
1) What is the most important NIST statistical test

2) How many different ways are there to evaluate a bitstring for randomness

Multiple choice:
1) The following are included in the NIST statistical test suite except
a) MinEntropy
b) Linear complexity
c) Rank test
d) Universal test

2) The following statements all false except for which statement
a) The frequency test tests for runs of 0's and 1's
b) The rank test inspects the frequency domain representation of the bitstring
c) The universal test computes the linear independence of rows in a matrix representation of the bitstring
d) The linear complexity test determines the length of the smallest set of LFSRs needed to reproduce the sequence

PUFs I (G)

Multiple choice:

1) The p-value-of-the-p-value test statistic reported by NIST represents
a) Whether the number of chips with a p-value larger than the critical value alpha pass the test
b) A result obtained from only one of the bitstrings included in the input file
c) Whether the distribution of p-values computed for all bitstrings across the 10 bins is uniform
d) A number that represents the cummulative results across all the individual tests

2) The ‘Proportion’ column represents
a) Includes a number that counts the number of bitstrings that pass the individual test
b) Includes a number that counts the number of bitstrings that fail the individual test
c) The pass/fail threshold applied to the bitstring p-values
d) The value of the test statistic