**COMBINATORICS AND GRAPH THEORY**

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**Diagnostic Task No. 1**

1. Write TRUE if the statement is true and FALSE if the statement is false and give a counterexample for every false statement for #s 1-11 and from 12 to 15, justify your answers.
2. For any set A, set A is a subset of the power set of A.

**ANSWER:** TRUE

1. For any sets A and B, we have (B – A) ⊆ A

**ANSWER:** TRUE

1. Let A be a set. The empty set is an element of the power set of A.

**ANSWER:** TRUE.

1. Let A, B, and C be sets. Then A − (B ∩ C) = (A − B) ∪ (A − C).

**ANSWER:** TRUE.

1. Let A and B be sets. If A has seven elements, A ∪ B has ten elements, and A − B has two elements, then B must contain eight elements.

**ANSWER:** FALSE. Since A = {3,4,5,6,7,8,9} B = {1,2,3,4,5,6,8,9}. So, A ∪ B = {1,2,3,4,5,6,7,8,9,10} and A – B = {1,2,6}

1. Let A be a set with 5 elements. All the following can exist
2. A subset of the power set of A with six elements.

**ANSWER:** TRUE

1. An element of the power set of A with six elements.

**ANSWER:** TRUE

1. An element of the power set of A has no element.

**ANSWER:** FALSE. If A = {{1,2,3,4,5,6},7,8,9,10,11}. And A has only 6 elements.

1. Let A and B be sets. A ⊆ B if and only if A ∪ (B − A) = B.

**ANSWER:** FALSE – if only if A∩B = B.

1. Let A, B and C be sets A ∈ B, B ⊆ C, and A ⊄ C.

**ANSWER:** TRUE

1. |A| - |B| = | A B|

**ANSWER:** TRUE

1. If | A x B| = |B x A| then A = B

**ANSWER: TRUE**

1. {a, b} {a, b, {a, b, c}

**ANSWER:** TRUE – since a and b is an element of set {a,b,{a,b,c}



**ANSWER:** FALSE – there should be an element in empty set

**ANSWER:** FALSE – empty set is not a proper subset of the empty set

**ANSWER:** TRUE – an empty set is a subset of every set