Bergen County Math League

Good Luck to You  **Good Luck to All**

Contest #1 **2021** **12 minutes** **Questions 1 & 2**

1-1. The 4th term of a sequence is 4 and the 6th term is 6. Every term after the 2nd is the sum of the two preceding terms. What is the 8th term of this sequence?

1-2. The circle circumscribed about regular heptagon *ABCDEFG* has an area of 196π. If the bisectors of angles *A* and *D* intersect at *P*, what is the length of $\overline{AP}$?

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Contest #1 **2021** **12 minutes** **Questions 3 & 4**

1-3. One urn contains 1 liter of water, while a second urn is empty. After $\frac{1}{2}$ of the water in the first is emptied into the second, $\frac{1}{3}$ of the water in the second is returned to the first. Then $\frac{1}{4}$ of the contents of the first is poured into the second, followed by a return of $\frac{1}{5}$ of the contents of the second into the first. At each successive pouring, from alternate urns, the denominator of the fractional part poured increases by 1. How many liters of water remain in the first urn after the 2021^{st} pouring?

1-4. The elements of set *B* are all the possible subsets of set *A*. Set *B* has 16 subsets. What is the number of elements in set *A* ?

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Contest #1 **2021** **12 minutes** **Questions 5 & 6**

1-5. For how many ordered triples of unequal positive integers (x, y, z) is a positive integral value attained by $\frac{x}{(x-y)(x-z)}+\frac{y}{(y-x)(y-z)}+\frac{z}{(z-x)(z-y)}$?

1-6. In parallelogram *ABCD*, the bisector of $\angle ABC$ intersects $\overline{AD}$ at *P*. If *PD* = 5, *BP* = 6, and *CP* =6, what is the value of *AB* ?