College Bound Math Problems #18
week of March 9, 2015

Note: These problems are related to Set #17, so please do that first. Problem #3 shows that the method used in Problem #2 quickly gets *very* accurate results. It is called the Babylonian method and was known over 3,000 years ago.

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1. (a) Using *only fractions*, divide each number into 2: $\frac{3}{2}$ _____ $\frac{17}{12}$ _____

(b) Using *only fractions*, find the average of $\frac{3}{2}$ and $\frac{4}{3}$ _____

2. Finding $\sqrt{2}$ with paper and pencil. 1 is too small to be the square root of 2 since ($1^2 = 1 < 2$), while 2 is too big ($2^2 = 4 > 2$). Again we start by guessing $1\frac{1}{2}$, since it's midway between them and follow a sequence of steps that gets us closer and closer to $\sqrt{2}$. Your approximations will be in Row #3 of the box below.

Use fractions and a pencil to put correct values in place of each "**?**" in the "**2nd time**" column. In the "**3rd time**" column, you can use a calculator if you wish.

Row	Steps	1st time	2nd time	3rd time
1	Guess (first time only). Then use the Row #3 result from preceding column.	$\frac{3}{2}$	$\frac{17}{12}$	**?**
2	Divide the Row #1 result into 2.	$\frac{4}{3}$	**?**	**?**
3	Average Row #1 and Row #2	$\frac{17}{12}$	**?**	**?**
4	Copy the result to the top of the next column.			
5	Do it all again or stop.			

3. Using a calculator let's see how close these results are to the actual value of $\sqrt{2}$.

(a) To 8 or more decimal places, what is the square root of 2?

(b) Write $1\frac{1}{2}$ and each number in Row #3 to at least 8 decimal places

(c) Subtract the value of $\sqrt{2}$ found in part (a) from each answer in part (b).

(d) Compare the results found in part (c) to each other and to the results in Set #17,