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Problem 2. An $x$ by $x$ square is drawn in the center of a 1 by 1 square, and then the corners are connected as shown. If the 5 regions all have the same area, what is $x$ ?


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Problem 3. If the average of $a$ and $b$ is 20, the average of $b$ and $c$ is 30 , and the average of $a$ and $c$ is 70 , what is the average of $a, b$, and $c$ ?


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Problem 4. In this problem, $\log (x)$ denotes the base 10 logarithm of $x$. Simplify the sum

$$
\sum_{k=1}^{9} \log \left(1+\frac{1}{k}\right)=\log \left(1+\frac{1}{1}\right)+\log \left(1+\frac{1}{2}\right)+\log \left(1+\frac{1}{3}\right)+\cdots+\log \left(1+\frac{1}{9}\right)
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Problem 5. On a recent backpacking trip, slow Mo hiked 9 miles per day for the first 6 days. Then fast Dave joined, and they each hiked 16 miles per day for the next 4 days. How many miles per day did Mo average for the entire trip?


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Problem 6. A cube with side length 1 is inscribed in a sphere. What is the radius of the sphere?


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Problem 7. How many ways can 7 people be split into two groups, if each group must contain at least 2 people?


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Problem 8. Let $\overleftarrow{n}$ denote the digit reversal of the natural number $n$, so that, for example, $\overleftarrow{123}=321$. Find

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(10+11+\cdots+99)-(\overleftarrow{10}+\overleftarrow{11}+\cdots+\overleftarrow{99})
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Problem 8. Let $\overleftarrow{n}$ denote the digit reversal of the natural number $n$, so that, for example, $\overleftarrow{123}=321$. Find

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Problem 9. What is the coefficient of $x^{25}$ in

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\prod_{k=0}^{\infty}\left(1+x^{2^{k}}\right)=(1+x)\left(1+x^{2}\right)\left(1+x^{4}\right)\left(1+x^{8}\right)\left(1+x^{16}\right)\left(1+x^{32}\right) \cdots \quad ?
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Problem 10. What is the base 10 representation of the binary number 11111011111 ?
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