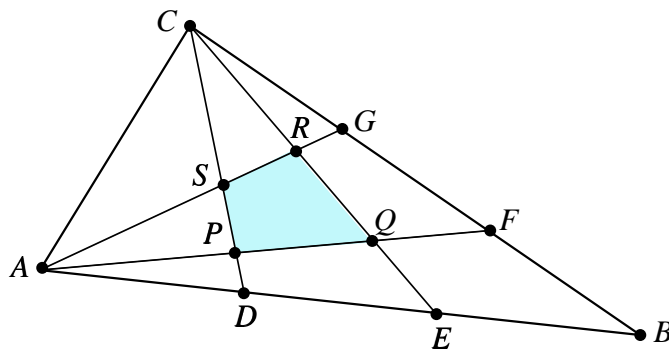# MATHEMATICS COMPETITION
### University of Georgia
### February 2, 2002

# Team Ciphering

1. You walk into McDonald's with $20 and the only items on the menu that you like are a junior burger, costing $1.66, and biggie fries, costing $1.17. In cents, what is the least amount of change you can possible have after ordering these two items in some quantities?

2. Two competing colonies of sentient bacteria struggle to rule the Universe. Every second, the population of each colony doubles and then increases by the population of the enemy colony, due to cross-breeding. Hence, if the populations of the two colonies are $A$ and $B$, after one second they will be $2A+B$ and $A+2B$, respectively. Assuming the initial populations of $A$ and $B$ were 3 million and 5 million, what will be the population of colony $A$ after 10 seconds?

3. Given $\triangle ABC$ with area 1, points $D$ and $E$ trisecting $\overline{AB}$, and points $F$ and $G$ trisecting $\overline{BC}$. What is the area of the shaded quadrilateral $PQRS$?



4. Find
$$\frac{1}{2} + \frac{1}{8} + \frac{1}{24} + \frac{1}{64} + \cdots + \frac{1}{k2^k} + \cdots.$$