#0 Mu Ciphering
MAΘ National Convention 2016

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#2 Mu Ciphering
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In how many distinct ways can seven identical pieces of candy be distributed among five people so that at least one of the people does not receive any pieces of candy? Each of the seven pieces must be given to one of the five people.

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For how many integers n is $\frac{n-71}{n-5}$ an integer?

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#4 Mu Ciphering
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#5 Mu Ciphering
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Find the point on the function $y = x^3 + 6x^2 - 36x + 6$ whose tangent line slope is a minimum.

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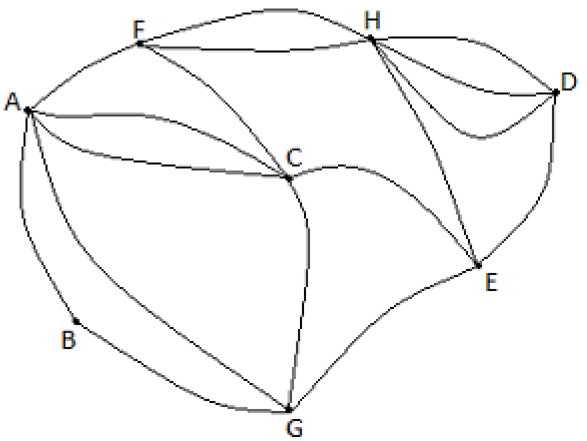

Mary begins her trek at the day care (point A in the diagram), and she wants to walk on every road in the diagram exactly once (a road connects two lettered points, and points may be landed on multiple times). Mary's trek ends at home, which must be located at which point in the diagram?

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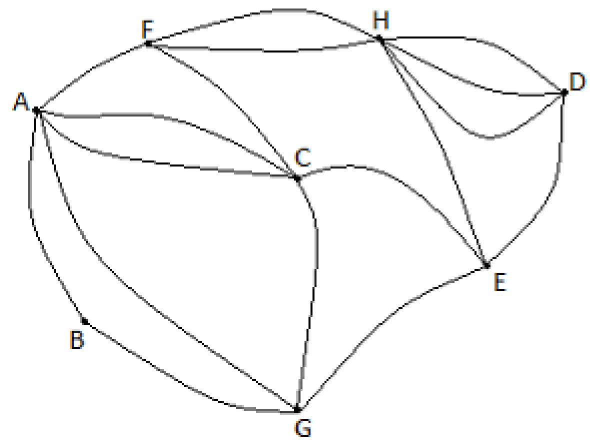

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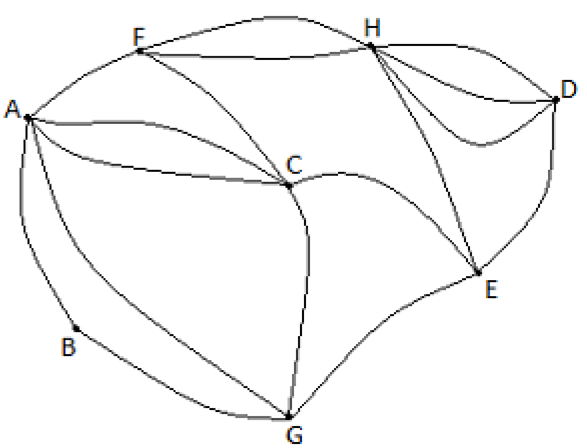

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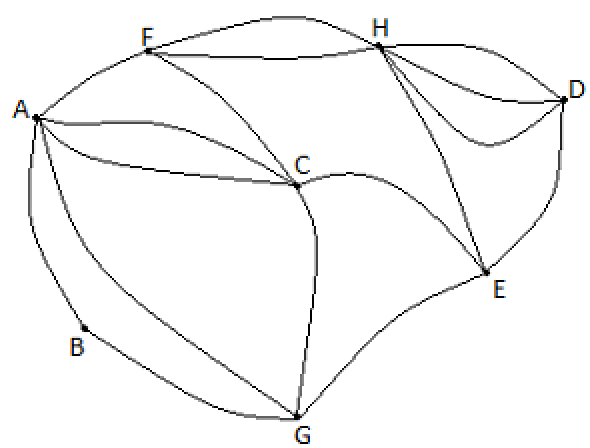

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If $\int_0^1 \frac{2x+1}{x^2+1}dx = \frac{\pi + \ln a}{b}$, where a and b are positive integers, find the value of $\frac{5ab}{2a+2b}$.

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Evaluate: $\lim_{n\to\infty}\left(\frac{3}{n}\sum_{i=1}^{n}\left(1+2\left(1+\frac{3(i-1)}{n}\right)^2\right)\right)$

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Find the value of *c* guaranteed by the Mean Value Theorem for the function $f(x)=2x^3-3x^2+3$ on the interval $[1,3]$.

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#10 Mu Ciphering
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A triangle has sides of length 9, 11, and 16. Find the product of the lengths of the radii of the triangle's inscribed and circumscribed circles.

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#11 Mu Ciphering
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#12 Mu Ciphering
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Owen is riding his bicycle on a straight, flat road at a constant rate of 15 feet per second. At the moment he passes underneath a balloon rising vertically at a constant rate of 5 feet per second, the balloon is already 45 feet above the road. At what rate, in feet per second, is the distance between Owen and the balloon increasing exactly three seconds after Owen passes under the balloon?

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The region bounded below by $y=(x-2)^2$ and above by $y=-(x-2)(x-6)$ is revolved about the line $x=2$. Find the volume of the resulting solid.

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Define a metafactorial $n!^*$ for positive integer n in the following way: $n!^* = n! \cdot (n-1)! \cdot \ldots \cdot 2! \cdot 1!$. In how many consecutive zeros does $50!^*$ end?

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