What is the period of the function
\[ f(x) = \cos^4 x - \sin^4 x \]?
Question #1
Alpha Ciphering
MAΘ National Convention 2014
\[
\begin{array}{cccc}
3 & 4 & -2 & 1 \\
5 & 1 & 0 & -1 \\
0 & -3 & 2 & 3 \\
4 & -1 & 0 & -5 \\
\end{array}
\]
Question #2
Alpha Ciphering
MAΘ National Convention 2014
The sum of the first two terms of a geometric series is 90. The sum of the sixth and seventh terms is $\frac{-10}{27}$. Find the sum of the first seven terms.
Question #3
Alpha Ciphering
MAΘ National Convention 2014

If \( x - y = 12 \) and \( \sqrt{x} + \sqrt{y} = 8 \)
What does "x"=?
Three dice are thrown. What is the probability that two or more of the dice show the same number?
The distance between the centers of two circles, with radii 5 and 6 is 16. How long is the common internal tangent segment?
Question #6
Alpha Ciphering
MAΘ National Convention 2014
Find the number of integers between 221 and 695 which are divisible by 4 or 7?
Question #7
Alpha Ciphering
MAΘ National Convention 2014
\[ \frac{\sqrt{18+2\sqrt{79}}}{\sqrt{20+2\sqrt{84}}} = \frac{\sqrt{J} + \sqrt{O} - \sqrt{Y} - 7\sqrt{2}}{-8} \]. What does \( J + O + Y =? \)
Question #8
Alpha Ciphering
MAΘ National Convention 2014
Find the equation of the tangent line that intersects the circle: \(x^2 + y^2 - 12x + 8y + 7 = 0\) at the point (3,2). The answer must be in the form \(Ax + By = C\), where \(A > 0\) and \(A, B,\) and \(C\) are relatively prime.
Question #9  
Alpha Ciphering  
MAΘ National Convention 2014  

Evaluate: \( \sin \left( \cos^{-1} \frac{-\sqrt{5}}{5} + \tan^{-1} \frac{-1}{3} \right) \)

Question #9  
Alpha Ciphering  
MAΘ National Convention 2014  

Evaluate: \( \sin \left( \cos^{-1} \frac{-\sqrt{5}}{5} + \tan^{-1} \frac{-1}{3} \right) \)
Question #10
Alpha Ciphering
MAE National Convention 2014
\[ \tan \frac{17\pi}{12} = ? \]