Precalculus Sprint

College of Charleston Math Meet
February 22, 2014

Instructions: Write the exact answer to each question in the corresponding box. Remember that the winners in this event are those participants who answer the most questions correctly *in a row* beginning with the first question. So, try to get as far as you can without making a mistake!

1. Given that $i = \sqrt{-1}$, calculate the value of i^{2014}.

   # 1:

2. Suppose the sequence $a_1, a_2, a_3, \ldots$ is defined recursively by the fact that $a_1 = 222$ and that $a_{n+1} = 2a_n + 34$ for $n > 1$. What is a_4?

   # 2:

3. Find the equation(s) of the asymptote(s) of the function $y = \dfrac{2x^3 - 3x^2 - 2}{x^2 + 4}$.

   # 3:

4. What is the smallest number of real zeroes that a polynomial of degree 37 can have?

   # 4:

5. If $f(x) = \sqrt{x - 1}$ and $g(x) = \dfrac{x}{x - 3}$, express the domain of the function $g(f(x))$ using interval notation.

   # 5:

6. Write the value of $\left(\cos \left(\frac{\pi}{4} \right) \cos \left(\frac{\pi}{12} \right) + \sin \left(\frac{\pi}{4} \right) \sin \left(\frac{\pi}{12} \right) \right)^2$ as a *simplified fraction*.

   # 6:

7. What real number x satisfies $e^{4x} + e^{2x} - 4 = 0$?

   # 7:

8. Suppose $p(x)$ is a quadratic polynomial which satisfies $p(-x) = p(x - 1)$ for all values of x and whose graph goes through the point $(1, 0)$. What is $p(2)/p(0)$?

   # 8:

COLLEGE *of* CHARLESTON

Math Meet
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Timed Sprint

Name (please print): _____

School Name: _____

Grade: _____

The grading for the Timed Sprints is unusual! Your grade will be the number of questions answered correctly, starting with the first question, before you make a mistake. For example, if you only answer questions 1-4 correctly and questions 7-13 correctly, your grade will be a "4" since you did not get question 5 right. You will have a limited amount of time to work on the sprint. Your paper will be collected at the end of this period.

By my signature below I certify that all of the work completed on this sprint is my own.

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