Quiz # 2 Solutions!!!!

By: The Rose Bowl

December 5, 2009

Hi kids! Well, it's official! The Oregon Ducks are going to the Rose Bowl! And even though Corey can't afford it, he's GOING TO THE GAME!!!! Go Ducks!!! Here are your quiz solutions. Have fun!

1. Here is the division. I can't find the division symbol in my typesetting program, so I'll just use lines:

$$\begin{array}{lr} & x^4 + 6x^2 + 23 \\ \cline{2-2} x^2 - 4 \quad | & x^6 + 2x^4 - x^2 + 4 \\ & \underline{x^6 - 4x^4} \\ & 6x^4 - x^2 \\ & \underline{6x^4 - 24x^2} \\ & 23x^2 + 4 \\ & \underline{23x^2 - 92} \\ & 96. \end{array}$$

   So, we have $x^6 + 2x^4 - x^2 + 4 = (x^2 - 4)(x^4 + 6x^2 + 23) + 96$.

2. By the remainder theorem, all we need to compute is $f(-1) = (-1)^{100} - (-1)^{45} + 4 = 1 - (-1) + 4 = 6$.

3. We start with the polynomial $p(x) = c(x-4)(x-2)(x-7)$, that already has roots of 2, 4, and 7, and we impose the condition that it has to go through the point $(0, 1)$ to determine c. We have that $p(0) = 1$, and so $1 = c(0-4)(0-2)(0-7) = c(-56)$, so $c = \frac{-1}{56}$, and our polynomial is $p(x) = -\frac{1}{56}(x-4)(x-2)(x-7)$.

4. There is a horizontal asymptote at $y = 0$, and Corey refers you to the class notes or to page 294 as to why. The numbers $x = 0, -1, 1, -3, 3$ are the vertical asymptotes or holes. All of them are vertical asymptotes except for $x = 1$, which is a root of the denominator that is also a root of the numerator and it has a multiplicity of 2 in the numerator, and 1 in the denominator. Therefore, $x = 1$ is a hole.