Free Response Practice #16
Calculator NOT Permitted

A table of values for a polynomial function, $g(x) = ax^3 + 5x^2 + 4x + c$, is shown below. Use the equation of $g(x)$ and the table to answer the questions that follow. *zero*

zero   *zero*   *zero*

x	-3	-2	-1	0	1	2	3	4
$g(x)$	110	32	0	-4	2	0	-28	-100

c =

a. Two of the zeros of $g(x)$ are specifically listed in the table. What are those two zeros? Then, what is the multiplicity of each zero? Give a reason for your response to both questions.

- $g(x)$ has a zero at $x = -1$ and $x = 2$ b/c $g(x) = 0$ at $x = -1$ and $x = 2$. **+1**

- $x = -1$ and $x = 2$ are both odd multiplicity of 1 **+1**
    b/c $g(x)$ changes signs at $x = -1$ and $x = 2$.
    & neither multiplicity can be 3 or more **+1**
        b/c the sum of the multiplicities would exceed the degree of 3.

b. Determine the values of a and c. Show your work or give an explanation for your reasoning.

- c is the y-intercept with x-value $= 0$. **+1**
    ∴ $c = -4$

(to find "a" chose an ordered pair and plug in)

- At $(1, 2)$

$g(x) = ax^3 + 5x^2 + 4x + c$
$2 = a(1)^3 + 5(1)^2 + 4(1) - 4$
$2 = a + 5 + 4 - 4$
$2 = a + 5$
$-3 = a$ **+1**

c. Between which two x – values in the table does the other zero of $g(x)$ lie? Explain your reasoning.

$g(x)$ has a zero between $x = 0$ and $x = 1$
    b/c $g(x)$ changes signs between $x = 0$ and $x = 1$ **+1**

d. Use the equation of $g(x)$ to find the third zero of $g(x)$, verifying your response to part c). Show your work.

$g(x) = -3x^3 + 5x^2 + 4x - 4$

```
-1)  -3    5    4   -4
          0    3   -8    4       +1
2)   -3    8   -4  |0|
           0   -6    4
      -3    2  |0|       +1
```

$g(x) = (x+1)(x-2)(-3x+2)$

$-3x + 2 = 0$
$2 = 3x$ **+1**
$\frac{2}{3} = x$