Free Response Practice #16
Calculator Permitted

Consider the function $f(x) = 9x^4 + 21x^3 + 7x^2 + x - 2$ to answer the following questions.

a. Find $f(-2.5)$ and $f(-1.5)$. What do these values suggest about the graph of $f(x)$ on the interval $-2.5 < x < -1.5$?

b. Use Descartes' Rule of Signs to determine the number of possible positive, negative, zero, and imaginary roots of $f(x)$. Make a chart that summarizes your results. Then, after investigating the graph of $f(x)$, which of the combinations from the table is correct and explain why.

c. What are all of the possible rational roots of $f(x)$? Of these possible roots, which two appear to be the most likely possible roots?

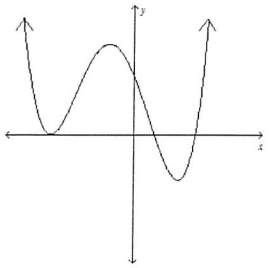
d. Find the roots of $f(x)$, real and/or imaginary. Show all of your work.

Roots of $f(x)$: _____

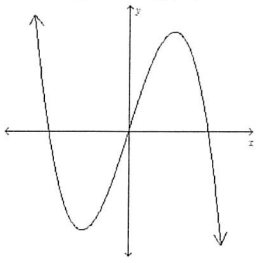
Free Response Practice #17
Calculator NOT Permitted

Pictured below are graphs of two different polynomial functions. All of the zeros of each function are real—none are imaginary. Answer the questions that follow about the two graphs, $f(x)$ and $g(x)$.

Graph of $f(x)$



Graph of $g(x)$



a. Based on the graphs, what types of polynomial functions are $f(x)$ and $g(x)$? Explain your reasoning.

b. What can be concluded about the value of a, if a is the leading coefficient in the equation of $g(x)$? Explain your reasoning.

c. How many points of inflection does the graph of $f(x)$ have? Give a reason for your answer.

d. If d represents the constant term in the equation of $g(x)$, what can be concluded about the value of d? Explain your reasoning.

Free Response Practice #18
Calculator NOT Permitted

A function, $g(x)$, has a root of $x = 2i$ and a root of $x = 3$, which has a multiplicity of 2.

a. Find an equation of $g(x)$.

b. Determine the left and right hand behavior of $g(x)$. Justify your reasoning.

c. A quartic function in the form $f(x) = ax^4 + bx^3 + cx^2 + dx + e$ is such that the coefficients of the quadratic and linear terms are 10 and –18, respectively. Additionally, $f(0) = 9$ and $x = 1$ is a root of multiplicity of 2. What is the value of $(a + b)$?

Free Response Practice #19
Calculator NOT Permitted

x	–3	–2	0	1	3	4
$F(x)$	50	16	–4	–2	–4	–20

The table above shows function values of a cubic polynomial function, $F(x)$. The function has two distinct zeros, $x = a$ and $x = b$, such that $a < 0$ and $b > 0$. Additionally, one of the zeros has a multiplicity of two.

a. Determine the left and right hand behavior of $F(x)$ based on the table of values. Give a reason for your answers.

b. What can be said about the leading coefficient of $F(x)$? Justify your reasoning

c. Between what two x – values in the table does the zero $x = a$ lie? What is its multiplicity? Justify your reasoning.

d. Between what two x – values in the table does the zero $x = b$ lie? What is its multiplicity? Justify your reasoning.

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