Meramec College Algebra Quiz 7 Form A Solution Fall 2009

NAME: _____Score_____/10

Please **print** your name

Red text is what you should have provided as response to the question. Blue text is the basis for the correct response to the question.

1. What are the possible rational zeros of the polynomial function whose rule is $f(x) = 3x^5 + 8x^3 + 4x + 5$.

$p \in \{\pm 1, \pm 5\}$ **p must be a divisor of the constant term.**

$q \in \{\pm 1, \pm 3\}$ **q must be a divisor of the leading coefficient.**

$\frac{p}{q} \in \left\{\pm 1, \pm \frac{1}{3}, \pm 5, \pm \frac{5}{3}\right\}$

2. What is the horizontal asymptote for the rational function whose rule is $f(x) = \frac{3x^4 + 2x^3 - 4x + 2}{7x^4 + 9}$.

The horizontal asymptote is the line whose equation is $y = \frac{3}{7}$.

You should be aware that an asymptote (vertical or horizontal) is a line, not a number nor a point. If the numerator and denominator have the same degree, the horizontal asymptote is the line whose equation is $y = \frac{\text{leading coefficient of the numerator}}{\text{leading coefficient of the denominator}}$

3. What are the vertical asymptotes of the rational function whose rule is $f(x) = \frac{x^4 + 2}{(x-1)(x+3)}$.

The vertical asymptotes are the vertical lines whose equations are x = 1 and x = -3.

Vertical asymptotes are the vertical lines through real zeros of the denominator which are not zeros of the numerator. In this case, the numerator has no real zeros and both zeros of the denominator are real, so the vertical asymptotes are at the zeros of the denominator.

4. What are the x-intercepts of the rational function whose rule is $f(x) = \frac{3x-2}{x^2+5x+6} = \frac{3x-2}{(x+2)(x+3)}$

The x-intercept is $\left(\frac{2}{3}, 0\right)$

The x-intercepts of a rational function are the real zeros of the numerator which are not zeros of the denominator. Clearly the zero of the numerator is $\frac{2}{3}$ and the zeros of the denominator are -2 and -3.

5. Consider the function whose rule is $f(x) = (x-4)^3(x+3)$. What are the zeros and what are their multiplicities.

4 is a zero whose multiplicity is 3.

-3 is a zero whose multiplicity is 1

It seems as if no-one studied the multiple page handout, or the textbook, or the Chapter summary, or lecture notes that dealt with polynomial and rational functions.