Meramec College Algebra Quiz 8 Form A COMMENTS Fall 2009

NAME: _____Score_____/10

Please **print** your name

Circle T or F, whichever is correct.

1. **T** F The functions ln and exp are inverses.
   The ln function is defined to be the inverse of exp.
2. T **F** The functions log and $\exp_2$ are inverses.
   The log function is defined to be the inverse of $\exp_{10}$ and so cannot be the inverse of $\exp_2$.
3. T **F** Every rational function has a vertical asymptote.
   Rational functions have vertical asymptotes at real zeros of the denominator which are not real zeros of the numerator. So it is easy to construct a rational function with no vertical asymptotes.
   For example the function whose rule is $f(x) = \frac{x+2}{x^2+1}$ has no vertical asymptote.
4. T **F** Every rational function has a horizontal asymptote.
   If the degree of the denominator is greater than the degree of the numerator, the rational function has no horizontal asymptote.
5. **T** F Every exponential function has (0, 1) as its y-intercept.
   Because $a^0 = 1$ for all non-zero real numbers a, it follows that $\exp_a(0) = a^0 = 1$ for every exponential function $\exp_a$. Consequently the point (0,1) is on the graph of every exponential function. Clearly (0,1) is a y-intercept.
6. **T** F Every logarithmic function passes the horizontal line test.
   Every logarithmic function is defined as the inverse of an exponential function. The corresponding exponential function is the inverse of the logarithmic function. So the logarithmic function has an inverse and that is possible if and only if the logarithmic function passes the horizontal line test.
7. T **F** Some polynomial functions have horizontal asymptotes.
   The normal considerations of end behavior of a polynomial function show the following:
   $$\text{As } x \to \infty, f(x) \to \pm\infty$$
   $$\text{As } x \to -\infty, f(x) \to \pm\infty$$
   which eliminates all possibility of horizontal asymptotes.
8. **T** F Every polynomial function is a rational function.
   A polynomial function can be written as a quotient with denominator 1. It is therefore a rational function.
9. T **F** Every exponential function is a rational function.
   It is impossible to write and exponential expression of the form a^x as a quotient of two polynomials.
10. **T** F exp(x) > 0 for all real values of x.
    The domain of exp is all real numbers. The graph of the function exp is entirely above the x-axis. Which means all second coordinates of points on the graph of exp are positive. Second coordinates of points on the graph of exp are range values exp(x). Consequently exp(x) > 0 for all real values of x.