MATH 1314 MLM Final Exam Formula Sheet

If $a=0$ or $b=0$, then $ab=0$.

If $a=b$ is true, then $a^n=b^n$ is true for any natural number n.

$$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$$

$$a^2+b^2=c^2$$

The Vertex of a Parabola

The vertex of the graph of $f(x)=ax^2+bx+c$ is

$$\left(-\frac{b}{2a}, f\left(-\frac{b}{2a}\right)\right).$$

We calculate the x-coordinate. Then we substitute to find the y-coordinate.

OCCURRENCE OF LINES AS ASYMPTOTES OF RATIONAL FUNCTIONS

For a rational function $f(x)=p(x)/q(x)$, where $p(x)$ and $q(x)$ have no common factors other than constants:

Vertical asymptotes occur at any x-values that make the denominator 0.

The x-axis is the horizontal asymptote when the degree of the numerator is less than the degree of the denominator.

A horizontal asymptote other than the x-axis occurs when the numerator and the denominator have the same degree.

An oblique asymptote occurs when the degree of the numerator is 1 greater than the degree of the denominator.

There can be only one horizontal asymptote or one oblique asymptote and never both.

An asymptote is *not* part of the graph of the function.

Logarithmic Properties: For any logarithm with base a or b, positive numbers M and N, and any real number p. The following properties hold.

1. $\log_a 1=0$
2. $\log_a a=1$
3. $\log_a x=y \quad\leftrightarrow\quad a^y=x$
4. $\log_{10} x=\log x$
5. $\log_e x=\ln x$
6. *Change of Base:* $\log_b M=\dfrac{\log_a M}{\log_a b}$
7. $\log_a a^x=x$
8. $a^{\log_a x}=x$
9. $\log_a M^p=p\log_a M$
10. $\log_a MN=\log_a M+\log_a N$
11. $\log_a \dfrac{M}{N}=\log_a M-\log_a N$