**Calculus, First Half Unit (Mizzou Academy)**

**Midterm Formulas**

Arguments of trigonometric functions are in radians.

**Equations of Lines**

Slope-Intercept Form: *y* = *mx* + *b*

Parallel Lines: *m*1 = *m*2

Perpendicular Lines: *m*1 = 

**Basic Transformations ( *c* > 0 )**

 Original graph: *y* = *f*(*x*)

 Horizontal shift *c* units to the **right**: *y* = *f*( *x* − *c* )

 Vertical shift of *c* units **upward**: *y* = *f*(*x*) + *c*

 **Reflection** (about the *x*-axis): *y* = −*f*(*x*)

 **Reflection** (about the *y*-axis): *y* = *f*(−*x*)

 **Reflection** (about the origin): *y* = *−f*(−*x*)

For polynomial function *p* and real number *c*:  **.

Function *f* is continuous at *c* if: *f*(*c*) is defined; exists; and .

If rational function  and *c* is a real number with *q*(*c*) ≠ 0, then: .

**Trigonometric limits:**  

**Product Rule** and **Quotient Rule:** For differentiable functions *f* and *g*:





**Chain Rule:** If *y* = *f*(*u*) is a differentiable function of *u* and *u* = *g*(*x*) is a differentiable function *x*, then *y* = *f*(*g*(*x*)) is a differentiable function of *x* and:

 or, equivalently:  or: 

**Basic Differentiation Rules**

1.  2.  3. 

4.  5.  6. 

7.  8.  9. 

10.  11.  12. 

13.  14.  15. 

16.  17.  18. 

19.  20.  21.

22. 

**Rolle’s Theorem:** Let function *f*  be continuous on closed interval [*a, b*] and differentiable on open interval (*a, b*). If *f*(*a*) = *f*(*b*), then there is at least one number *c* in (*a, b*) such that *f’*(*c*) = 0.

**Mean Value Theorem:**  Let function *f*  be continuous on closed interval [*a,b*] and differentiable on open interval (*a, b*). Then there is at least one number *c* in (*a, b*) such that

