**DERIVATIVE:**

Knowing that the sum and difference rules (f+-g)' = f'+-g' we differentiate each term.

Knowing the power rule, where derivative of any x^n is nx^n-1, we apply this to

Knowing the derivative of any cx is c, we apply this to

Knowing the derivative of a constant is zero we can apply this to our constant,

We find the derivative first below:

**DERIVATIVE EQUATIONS:**

Remembering the product rule: (u\*v)'= u'v+uv'

Remembering the quotient rule: (f/g)'= gf'=fg'/g^2

Remembering the chain rule: f(g(x))'= f'(g(x))g'(x)

**POINT SLOPE EQUATIONS:**

Remembering the equation for a line y= mx+b

Remembering the equation for a point on a line y1-y2= m(x1-x2)

**ANTIDERIVATIVE**

Remembering the antiderivative of x^n(dx)= (1/(n+1))(x)^n+1+C

**MEAN VALUE THEOREM:**

f'c = f(b)-f(a)/b-a

**LINEAR APPROXIMATION**

L(x)= f(a)-f’(a)(x-a) and is accurate for values close to x=a

ERROR IN APPROXIMATION

Delta Y = f(x+delta X)- f(x) (delta y is called propagated error) ACTUAL change in y

Dy= f’(x)dx differential of y represents the change in y ESIMATE change in y  
Dx or Delta X is the measurement error.

**SKETCHING:**

**FIRST DERIVATIVE**

We use the first derivative of f(x) to find the critical points and intervals of increase and decrease.

**CRITICAL POINTS**

Find cp by setting the derivative to 0. To find exact points, plug into original equation

**INTERVALS**

find intervals of inc/dec by selecting intervals and plugging into derivative to find the sign + or -.

**SECOND DERIVATIVE**

We use the second derivative of f(x) to find the points of inflection and intervals concavity

**IINFLECTION POINTS**

Find ip by setting the second derivative to 0. Plug into original equation to find exact points of inflection.

**CONCAVITY**

Concavity by selecting intervals and plugging into second derivative to find the sign + or

**HA**

if degree numerator = denominator HA = degree

if degree numerator < denominator HA = 0

if degree numerator > denominator no HA

**VA**

set denominator = 0, if no denominator, no HA