What the Derivatives Tell You

What does the first derivative tell us?
f ’(x)

Critical points:
Set f ‘= 0 or undefined yields critical points

Intervals of increasing/decreasing
Put the critical points on a number line and then test in f ’ to see if (+) or (-)
*These are the slopes of the tangent lines.
(+) increasing
(-) decreasing

If the slopes of the tangents change, then you have relative max/min
If changes from (+) slope to (-) slope, then relative max
If changes from (-) slope to (+), then relative min

What does the second derivative tell us?
f ’’(x)

Possible Inflection Points
Set f ‘’ = 0 or undefined for these possible IP
Put possible IP on a number line and then test in f ‘’ to see if (+) or (-)
*These indicate the concavity
(+) concave up
(-) concave down

If the values change from (+) to (-) or from (-) to (+), then you have an inflection points

*Note – you can also use the critical points in the second derivative to determine if relative max/min
i.e. if f ‘’ = (+) at a critical point then it is > 0 and thus concave up there, so relative min
if f ‘’ = (-) at a critical point then it is < 0 and thus concave down there, so relative max

Refer to other handout for when to determine how the rates increase/decrease