Section 3.10 Linear Approximation

A tangent line can approximate a y-value on a curve if the x-value is very close to the point of tangency.

$y_1 = x^2$ y_2 = tangent line at (1, 1)

$Y_1 = X^2$ $Y_2 = 2X - 1$

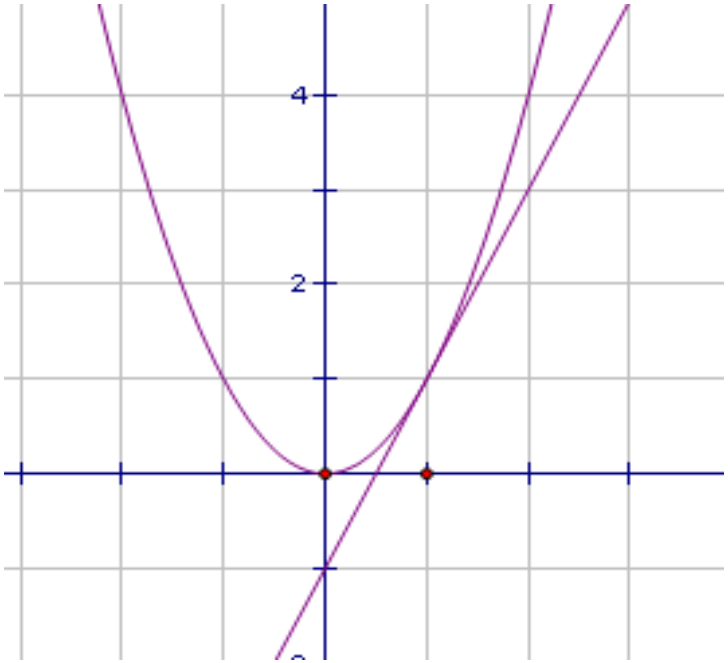
Enter both equations into your calculator.

Look at the table of values

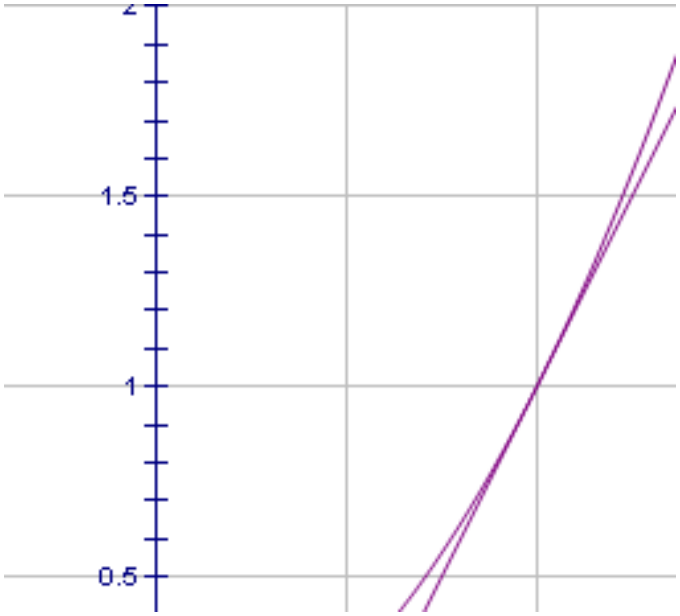
X	Y1	Y2
1		
2		
1.1		
1.0001		

$Y_1 = X^2$ $Y_2 = 2X - 1$

Now look at the graphs.



Zoom in at (1,1)



Tangent line is the **linearization** of f(x) at x = a.

Written $y = m(x-x_1) + y_1$

You can use the linearization to approximate values on the curve near the point of tangency.

Example

- Find the linearization of $f(x) = \sqrt{x+1}$ at x = 0.
- Then use the linearization to approximate $\sqrt{1.05}$
- Is the approximation an over or under estimate.

Example

- Find the linearization of $f(x) = \tan x$ at $x = \pi$.
- Then use the linearization to approximate tan (3.2) .
- Is the approximation an over or under estimate.

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- A turkey is cooking in the oven, and Macon is measuring its temperature at regular intervals. As she puts the turkey in the oven, its temperature is 50°. After the first hour of cooking, its temperature is 93°. After 2 hours of cooking, its temperature is 129°. Predict what the temperature could be after three hours of cooking.