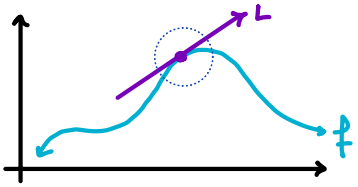
MATH 121

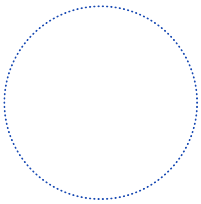
LOCAL LINEAR APPROXIMATION

GOALS

- ☐ KNOW HOW TO COMPUTE THE LOCAL LINEAR APPROXIMATION (LINEARIZATION) OF $f(x)$ AT $x = a$
- ☐ APPLY LOCAL LINEAR APPROXIMATION

MAIN IDEA FOR A DIFFERENTIABLE (CONTINUOUS AND SMOOTH) FUNCTION, WE CAN USE THE TANGENT LINE AT $x = x_0$ TO APPROXIMATE THE FUNCTION NEARBY.





e.g. $\sqrt[3]{7.8}$

- DEFINE f:
- CHOOSE PT. OF TANGENCY CLOSE TO 7.8 WHERE WE CAN EVALUATE f.
- FIND TANGENT LINE:

· USE $L(x)$ TO APPROXIMATE f:

FORMULA:

$$L(x) =$$

EX: FIND LINEARIZATION OF $f(x) = e^x$ AT $x = 0$.

Ex: $f(x) = \sin(2x)$ AT $x_0 = 0$

Ex: APPROXIMATE $\arctan(1/4)$ USING L.L.A.

Ex: APPROXIMATE $\sqrt{15.8}$