Lecture Handout #10: Oct 4

Approximations with Tangent Lines

Approximate $f(x) = x^2$ for x near 3: $a =$ 3 $f(a) =$ ______ $f'(a) =$ ______

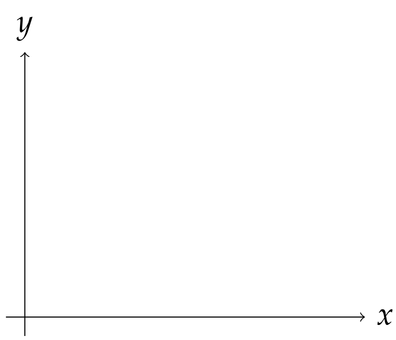
tangent line at $x = a$: $y =$ ______ (height at a) $+$ ______ (slope at a) $\times$ ______ (step from a)

tangent line at $x = 3$: $y =$ ______________________________

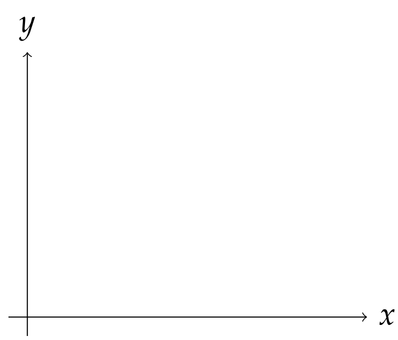
x	step	estimate of x^2	actual x^2
3.1	______	______	______
______	______	______	______
______	______	______	______

The Second Derivative and Concavity

Sketch graphs of a function $f(x)$ with:

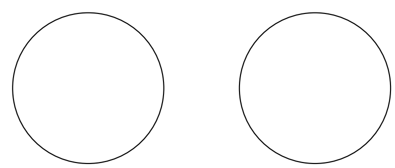


$f''(x) > 0$



$f''(x) < 0$

f'' mnemonic



Concavity from Tabular Data

$C(t)$ gives the number of passenger cars (in millions) in US in year t

t	1940	1950	1960	1970	1980
$C(t)$	27.5	40.3	61.7	89.2	121.6

estimate of $C'(t)$ ______ ______ ______ ______

From 1940 to 1980, does $C'(t)$ **increase** or **decrease**?

Sign of $C''(t)$? ______________