MAT137

- Today: Trig derivatives and implicit differentiation.
- Homework before Thursday's class: watch videos 4.1, 4.2.

Computations!

Compute the derivatives of the following functions:

- $f(x) = \tan(3x^2 + 1)$
- $f(x) = (\cos x)(\sin 2x)(\tan 3x)$
- $f(x) = \cos(\sin(\tan x))$
- $f(x) = \cos\left(3x + \sqrt{1 + \sin^2 x^2}\right)$

Derivative of cos

Let

$$g(x) = \cos x.$$

Obtain and prove a formula for its derivative directly from the definition of derivative as a limit.

Hint: Imitate the derivation in Video 3.11.
If you need a trig identity that you do not know, google it or ask your neighbor.

Derivatives of the other trig functions

Using all the basic differentiation rules, as well as

$$\frac{d}{dx}\sin x = \cos x, \qquad \frac{d}{dx}\cos x = -\sin x,$$

quickly obtain and prove formulas for the derivatives of tan, cot, sec, and csc.

Implicit differentiation

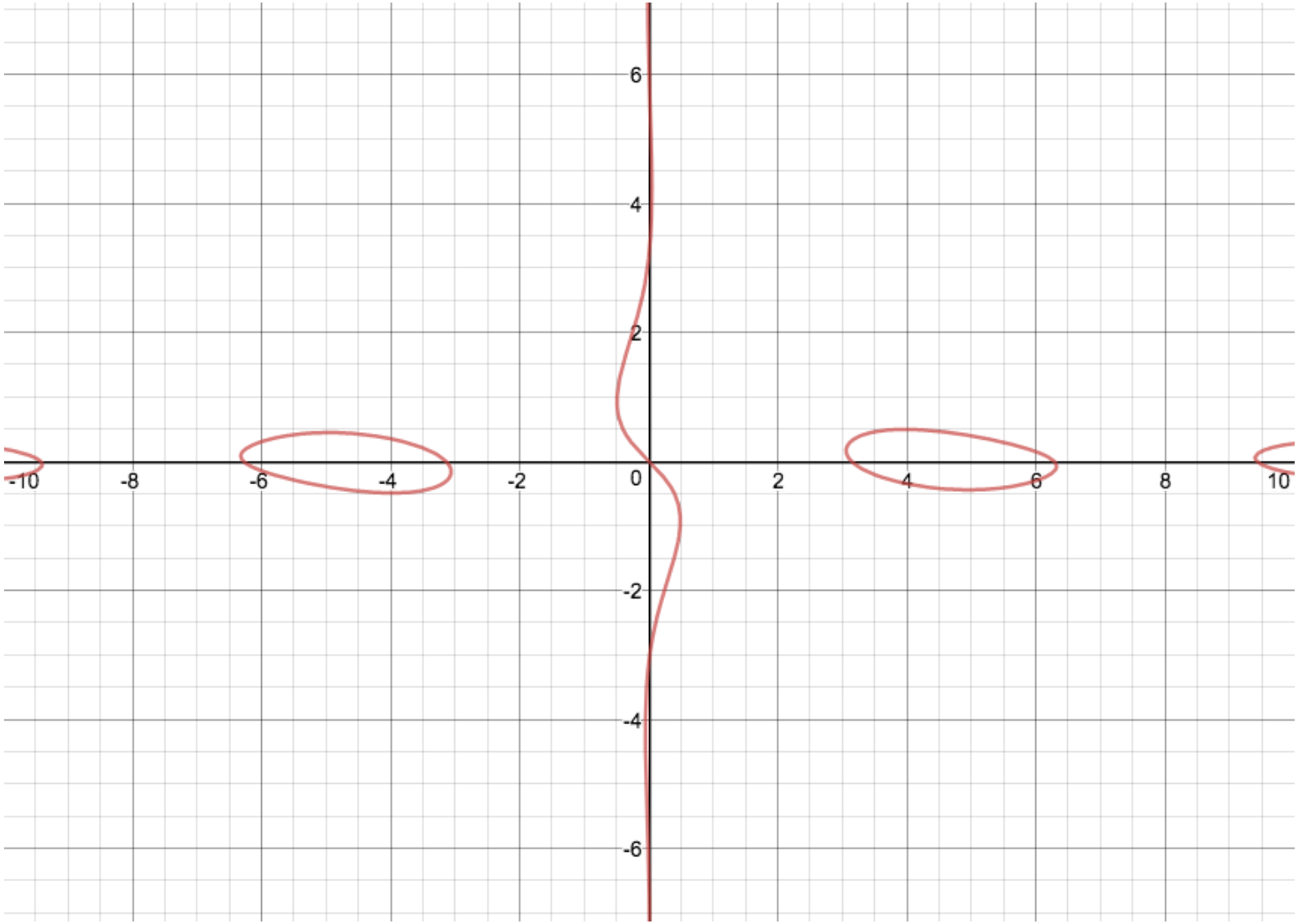
The equation

$$\sin(x+y) + xy^2 = 0$$

defines a function $y = h(x)$ near $(0,0)$. graph

Using implicit differentiation, compute

1. $h(0)$
2. $h'(0)$
3. $h''(0)$
4. $h'''(0)$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