- Assignment #3 due on November 5

- TODAY: Trigonometric and implicit differentiation

- MONDAY: Functions and inverse functions
  (Videos 4.1, 4.2)

Compute the derivatives of the following functions:

1. $f(x) = \cos(\sin(\tan x))$

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

3. $f(x) = (\cos x)(\sin 2x)(\tan 3x)$

A pesky function

Let $h(x) = \begin{cases} x^2 \sin \dfrac{1}{x} & \text{if } x \neq 0 \\ 0 & \text{if } x = 0 \end{cases}$.

1. Calculate $h'(x)$ for any $x \neq 0$.

2. Using the definition of derivative, calculate $h'(0)$.

3. Calculate $\lim\limits_{x \to 0} h'(x)$

   Hint: Questions 2 and 3 have different answers.

4. Is h continuous at 0?

5. Is h differentiable at 0?

6. Is h' continuous at 0?

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. $h'''(0)$