

# Chapter 3.5: Differentiating Trig Functions

## Calculus I

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1. Take the derivative of the following functions:
  - (a)  $f(x) = \sin(2x)$
  - (b)  $f(x) = \cos(x) \sin(x)$
  - (c)  $f(x) = e^{-\cos(2x)}$
  - (d)  $f(x) = \sin^2(x)$
  - (e)  $f(x) = \sin(x^2)$
2. Let  $f(x) = \sin(x)$ .
  - (a) Sketch  $f(x)$  and  $f'(x)$ .
3. Let  $g(x) = \sin(2x)$ .
  - (a) Determine  $g'(x)$ .
  - (b) Sketch  $g(x)$  and  $g'(x)$ .
  - (c) Why do the graphs have the shape they do?
4. Let  $g(x) = \sin(x^2)$ .
  - (a) Determine  $g'(x)$ .
  - (b) Sketch  $g(x)$  and  $g'(x)$ .
  - (c) Why do the graphs have the shape they do?
5. Let  $h(x) = \sin(\ln(x))$ .
  - (a) Determine  $h'(x)$ .
  - (b) Sketch  $h(x)$ . Puzzle over this for a bit, and be suspicious of whatever plots wolfram or desmos makes for you. What happens to  $h'(x)$  as  $x$  gets large?