Chapter 3.5: Differentiating Trig Functions
Calculus I
College of the Atlantic. October 28, 2024

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?
   (c) For what values of x does $h(x) = 0$?

6. Let $q(x) = \sin(\ln(x))$.

   (a) Determine $q'(x)$.
   (b) Sketch $q(x)$. Puzzle over this for a bit. Why do the graphs have the shape that they do?