Math 141 - Homework 6 **Name:** _____

Find the derivative of each function.

1. $f(x) = x^2 - \sec x$

2. $y = \sin x \tan x$

3. $g(x) = \dfrac{\cos x}{x}$

4. Let $f(x) = x - 2\cos x$.

   (a) Find all values of x in the interval $[0, 2\pi)$ where the slope of the tangent line is 3.

   (b) Find the values of x in the interval $[0, 2\pi)$ where the tangent line is horizontal.

Use the chain rule to find the derivatives of the following functions.

5. $y(x) = \sqrt{1 - x^2}$

6. $s(t) = \sin(3t^2)$

7. $y = \dfrac{1}{(5x^2 - 1)^3}$

8. $y = \cos(1 - x)$

9. $h(t) = \sec(4t + 3)$

10. $f(x) = \sin^{-3} x$

11. $f(\theta) = \tan(3\theta)$

12. $g(x) = \left(x + \dfrac{1}{x}\right)^8$

13. Let $y = \sin u$ and $u = 5x - 1$. Find $\dfrac{dy}{dx}$ by using Leibniz's notation for the chain rule: $\dfrac{dy}{dx} = \dfrac{dy}{du}\dfrac{du}{dx}$.

14. Find the second derivative of $y = \sin x \cos x$.