Reading Stewart §2.5.

1. Differentiate the following functions by any legal method. Simplify your answers.

   a) $f(x) = x \sin x + 3 \cot x$ b) $g(\theta) = \sec\theta \tan\theta$ c) $h(t) = \dfrac{\cos t}{1 - \sin t}$

2. Find (and simplify) an equation for the tangent line to the curve $y = (2 + x)\cos x$ at the point $(0, 2)$.

3. Find all values of x between 0 and 4π at which the graph of the function $g(x) = x + 2\sin x$ has a horizontal tangent line.

4. Differentiate the following functions by any legal method, and simplify your answers. You may (and should) use the differentiation rules, including the Chain Rule.

   a) $f(x) = \sqrt{\cos x}$ b) $g(x) = \cos\sqrt{x}$ c) $h(t) = (3t^2 - 7t + 4)^7$

5. Differentiate the following functions by any legal method, and simplify your answers.

   a) $F(x) = \sin(5 + x^3)$ b) $G(x) = 5 + \sin^3 x$ c) $Q(x) = (x^2+1)^5(x^2+2)^4$

6. Differentiate the following functions by any legal method, and simplify your answers.

   a) $y = \sin(x^2 \cos x)$ b) $R(u) = \left(\dfrac{u+1}{u^3+4}\right)^5$

   c) $f(x) = \sqrt{x + \sqrt{x}}$ d) $g(x) = \sqrt{\cos(x^2)}$