Math 151
Week-In-Review 6
3.3, 3.4, 3.5, 3.6
Todd Schrader

Problem Statements

1. Find $f'(x)$ if $f(x) = \sin(x) + 2\cos(x) - 3\sec(x) + 4\tan(x) + 5\csc(x) - 6\cot(x)$.

2. Find the equation of the tangent line to the curve $g(x) = 10\sec(x)$ when $x = \dfrac{\pi}{3}$.

3. Find all values of θ for which the equation $h(\theta) = \theta + \cos(\theta)$ has a horizontal tangent line.

4. Find the derivative of the following functions. Do not worry about simplifying.

(a) $f(x) = \left(x^6 - 15x - 5\right)^{12} + 4^{117x+23}$

(b) $h(x) = 8\cot^{10}\left(e^{2x+3\sin(-5x)}\right)$

(c) $g(t) = \dfrac{\sec(5x) \cdot 3^{2x+1}}{e^{\sqrt{3x}}}$

5. Find $\dfrac{dy}{dx}$ for the following equations.

   (a) $x^5 + y + y^7 = e^y - 11$

   (b) $2y^3 - \dfrac{3x}{y} = \csc(x) + \sin(y) - e^{x^2 y^3}$

6. If $y = J(x)$ satisfies the equation $xy'' + y' + xy = 0$, find $J''(0)$ if $J(0) = 1$ and $J'(0) = 0$.

7. Determine the slope of the tangent line to the curve $xy = 1 + \cos(x)$ at the point $\left(2\pi, \dfrac{1}{\pi}\right)$.

8. Show the derivative of $f(x) = \arccos(x)$ is $f'(x) = \dfrac{-1}{\sqrt{1 - x^2}}$.

9. Show the derivative of $f(x) = \ln(x)$ is $f'(x) = \dfrac{1}{x}$.

10. Show the derivative of $f(x) = \log_b(x)$ is $\dfrac{1}{x \ln(b)}$.

11. Find the derivative of $h(x) = \arcsin(x) + \arccos(x) - \arctan(x) + \ln(x) + \log_3(x) - \log(x)$.

12. Find the derivative of $g(x) = \log_6(\sin(x)) \cdot \arctan(5^{4x})$.

13. Find the derivative of $y = x^{f(x)}$, assuming $f(x)$ is a differentiable function.

14. Find the derivative of $f(x) = \dfrac{4x^3 e^x \cos(2x)}{\arcsin(x) \cdot \ln(x)}$