

Practice Problems S4

- Use techniques of differentiation to find the derivatives of the following functions:
 - $f(x) = \frac{\sin(x)}{\cos(x)+x \sin(x)}$;
 - $f(x) = x^3 \tan^2(x^4)$;
 - $f(x) = \frac{1}{\sqrt{1+x^2}}$.
- Find the (x, y) -coordinates of the points on the graph of the function $y = x^3$ where the tangent lines have slope $m = 3$.
- Consider a curve described by the equation $x^2y - xy^2 = 2 \cos(y - 1)$.
 - Use implicit differentiation to find $y' = \frac{dy}{dx}$.
 - Find the equation of the tangent line to the curve at $(-1, 1)$.
- Find the tangent line to the parabola $x = y^2$ at $(4, -2)$.
- Find the local linear approximation of $f(x) = \sin x$ at π .
 - Estimate the value of $\sin \frac{3\pi}{4}$.
 - What is the error?
- Let $f(x) = \sqrt[3]{x}$.
 - Find the local linear approximation of $f(x)$ at $x = 1$;
 - Use this approximation to estimate $\sqrt[3]{1.09}$;
 - Use an appropriate linear approximation of $f(x) = \sqrt[3]{x}$ to estimate the value of $\sqrt[3]{0.99}$.
- Use a suitable local linear approximation to estimate the value of $\frac{1}{2.003}$.