APPM 1350 Recitation - Fall 2021 - Week 6

September 28, 2021

1. Calculate the derivatives of the following functions.
   (a) $f(x) = x(x + \sin(x))$
   (b) $f(x) = \cos^2(2x)$
   (c) $f(x) = x\tan(2x)$
   (d) $f(x) = \frac{x}{\sqrt{x^2+1}}$
   (e) $f(x) = A\tan(3x) + B\frac{1}{\sqrt{x}}$, where A and B are constants
2. Find the 50th derivative of $f(x) = \cos(2x)$.
3. For what values of a and b is the line $2x + y = b$ tangent to the parabola $y = ax^2$ when $x = 2$?
4. Find the equation of the line that is tangent to the parabola $y = x^2 - 2x - 1$ and passes through the point $(5, 5)$.
5. For the following problems, you will be taking implicit derivatives.
   (a) Calculate dy/dx for the ellipse given by
   $$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1.$$
   (b) Calculate dy/dx for the equation
   $$\cos(xy) = x + \sin(y).$$
   (c) Find the equation for the tangent line to the curve at the point $(1, 1)$:
   $$x^2 + xy + y^2 = 3$$

   .