MATH 104 Workshop 4
Marginals, chain rule, and logarithmic differentiation

If you did not attend the workshop, please submit answers to questions 2 and 3.

1. Evaluate $\frac{d}{d\theta} \log(\csc\theta)$.

2. A particle moves along the Cartesian plane from time $t = \pi/2$ to time $t = \pi/2$. The x-coordinate of the particle at time t is given by $x = \cos t$, and the y-coordinate is given by $y = \sin t$, so the particle traces a curve in the plane.

   (a) When does the tangent line to that curve have slope 1?

   (b) What is the equation of the tangent line at this point?

3. Differentiate $f(x) = (x+1)(3x^2 + 10)^2(ex^3 + 1)^3(x^4 + e^x)^4(x^5 + \pi^x)^5$

4. (Revisiting Workshop 1 bussiness problem) M-Wave Co. makes and sells the world's first pocket quantum computers! When each quantum computer is sold for \$500, the weekly demand is 4,000 units. For every \$1 increase in the price of each unit, the number of quantum computers sold per week decreases by 10. Assume that it costs \$300 to produce each quantum computer.

   (a) What is the marginal cost, marginal revenue, and marginal profit?

   (b) When is profit maximized?