

Midterm 2 Review Worksheet

Math 1A, section 103

March 13, 2014

0. (Warmup.) What is the derivative of $f(x) = (x + 1)^2$?
1. Find the derivative of $\cos(x)^{\sin(x)}$.
2. Find the equation of the tangent line to the ellipse $x^2 + 2y^2 = 3$ at the point $(1, 1)$. Sketch the ellipse and the tangent line.
3. If $f(x) = \sin(2x)$, what is the n th derivative $\frac{d^n}{dx^n} f(x)$?
4. Use linear approximation or differentials to approximate the value of $\sqrt{9.2}$. Then use your calculator to see how close your approximation is.
5. A Ferris wheel with a radius of 10 m is rotating at a rate of one revolution every 2 minutes. How fast is a rider rising when his seat is 16 m above ground level?
6. Use implicit differentiation to find the slope of the tangent line to the curve $2^y + xy = x^2$ at the point $(2, 1)$.
7. A freshly brewed cup of coffee has temperature 95°C in a room at a fixed room temperature of 20°C . When its temperature is 70°C , it is cooling at a rate of 1°C per minute. When does this occur? (You may use Newton's Law of Cooling: that the rate of cooling of an object is proportional to the temperature difference between the object and its surroundings: so $T(t) - T_{room} = Ae^{-kt}$ for some A and k .)