MATH 235 (Calculus I)
due Thurs 9 Nov 2017

Take-Home Quiz 6: Technical applications of derivatives (§3.10, 4.1-4.2)

Directions: This quiz is due on November 9, 2017 at the beginning of lecture. You may use whatever resources you like – e.g., other textbooks, websites, collaboration with classmates – to complete it **but YOU MUST DOCUMENT YOUR SOURCES**. Acceptable documentation is enough information for me to find the source myself. Rote copying another's work is unacceptable, regardless of whether you document it.

---

1. **§3.10 #10** Let $f(x) = e^x \cos x$.
   (a) Find the linearization of $f(x) = e^x \cos x$ near $x = 0$.
   (b) Determine the values of x for which the approximation is accurate to within 0.1. *Hint: On* `desmos.com` *type in* $|e^x \cos x - 1 - x| < 0.1$.
   (c) Find the differential dy.
   (d) Let $\Delta x = 0.5$. Evaluate dy and Δy.
   (e) Graph $f(x)$ centered at $x = 0$. On the same graph illustrate your answers to parts (a)-(d). Label dx on your graph, too.
2. **§3.10 #32** Let $f(x) = (x-1)^2$, $g(x) = e^{-2x}$, and $h(x) = 1 + \ln(1-2x)$.
   (a) Find the linearizations of f, g, and h at $x = 0$. What do you notice? How do explain what happened?
   (b) Graph f, g, h, and their linear approximations on the same graph. For which function is the linear approximation the best? For which is it the worse? Explain.
3. **§4.1 #40** Let $g(\theta) = 4\theta - \tan\theta$.
   (a) What is the image (range) of g?
   (b) Find the critical points of g. Give both coordinates $(\theta, g(\theta))$ for each one.
   (c) Graph g. Which critical points are global extrema (if any)? Which are only local extrema (if any)?
4. **§4.2 #36** At 2p a car's speedometer reads 30 mph. At 210p it reads 50 mph. Show that at some time between 2p and 210p the acceleration is exactly 120 mi/hr^2.