Math 231 Calculus 1 Fall 13 Sample Midterm 2
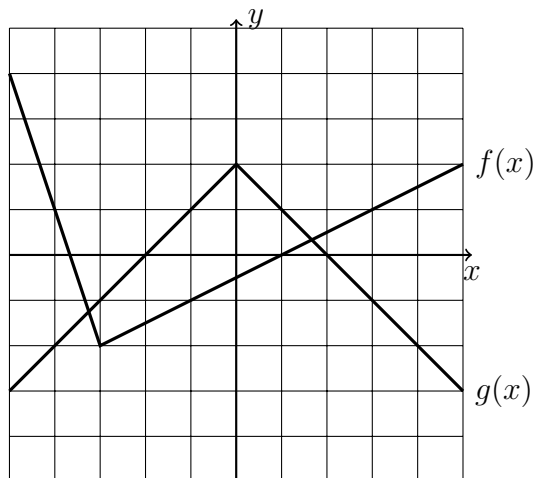
(1) Find the derivatives of the following functions
  (a) $xe^{\sqrt{2x+1}}$
  (b) $\frac{x}{2\cos(3x)-2}$
  (c) $x^x + \ln(\tan(x))$
  (d) $\tan^{-1}(1/x)$

(2) Find the second derivatives of the functions above.

(3) The graphs of the functions f and g are shown below.

  (a) Let $h(x) = f(x)g(x)$ Find $h'(4)$.
  (b) Let $h(x) = f(g(x))$. Find $h(-1)$.

(4) Use implicit differentiation to find the tangent line to the ellipse $4x^2 + y^2 = 8$ at the point $(-1, 2)$.

(5) Find $\frac{dy}{dx}$ for the implicit function $x^3y^2 + 2xy^2 = x + y$.

(6) A house lies 5 miles from the freeway, on a road perpendicular to the freeway. If you drive on the freeway at 50mph, how fast is your distance to the house changing when you are two miles past the junction?

(7) Use a linear approximation to estimate $\sqrt[3]{124}$. What is the percentage error?

(8) Find the absolute maxima and minima of $f(x) = 2x^2 4x - 2$ on the interval $[1, 5]$.