Math 151: Sections 1-3, 74.
Workshop 1: Review and tangents.

Problem 1. Draw the graph of a function $f(x)$ with the following properties: f is odd, f has a horizontal asymptote at $y = 4$, and $f(1) = 8$.

Problem 2. Recall that the equation of a line, with slope m and going through point (a, b), is $y = b + m(x - a)$.

(1) Graph, on a single xy plane, the lines going through the point (a, b) with slope m: $(0, 0), 1/2$; $(0, 0), 2$; $(3, 3), 1/2$; and $(3, 3), 2$.
(2) Find all points of intersection of these lines. (You can do this by solving pairs of equations or by using the trace function on your calculator. If you do the latter, then check the points by "plugging-in".)
(3) Find the area of the quadrilateral bounded by these lines. (Hint: cut up the square with vertices $(0, 0), (3, 0), (3, 3), (0, 3)$.)

Problem 3.

(1) Graph $f(x) = x^3 - 3x + 2$. Label the points of the graph with arguments $a = -2, -1, 0, 1, 2$.
(2) For each of the points $a = -2, -1, 0, 1, 2$ find a line $g(x) = f(a) + m(a) \cdot (x - a)$ which goes through $(a, f(a))$ and is close to the tangent line. Do this by graphing both f and g on the same screen, zooming into the point $(a, f(a))$, and adjusting the value of $m(a)$ until the graphs agree locally.
(3) Using the previous step, record the table of values $m(a)$ for the same values of a. Plot these points on a separate xy plane. Guess a function $h(x)$ which goes thru these points. (Hint: a simple polynomial.)
(4) Check your guess by finding $m(3/2)$ as in step (2) and comparing the value you find to $h(3/2)$.

Problem 4. Saul Box Company makes boxes as follows: we take a rectangular piece of cardboard with width $4x$ ft. and height $x + y$ ft. We fold the width into four equal pieces (of length x ft.). We then glue the two sides of length $x + y$ ft. together and cut slits of length $x/2$ ft. at all eight corners, along the crease. Lastly we fold down the eight flaps (four form the bottom, four the top) and tape it closed. (Try it with a piece of paper!)

So, for example, to make a box with all sides of length one foot, we start with a rectangle with width 4 ft. and height 2 ft.

Our only client, ACME Nitroglycerin, Inc., has ordered a large supply of boxes, all with volume 2 cubic feet. Use this to find a relation between x and y. Give an equation, in terms of x only, for the area of cardboard required to make a single box. Graph this equation. Using the zoom function, find the value of x which minimizes the amount of cardboard required to make a box of volume 2 cubic feet.